

# The Mining Journal

## RAILWAY AND COMMERCIAL GAZETTE

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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**MR. JAMES H. CROFTS, STOCK AND SHARE BROKER,**  
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**ESTABLISHED 1842.**

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60 Don Pedro, 11s.	25 St. Harmon.
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Grogwinion, 23s.

Glenroy, 17s.

Gorsead and Mer., 24s.

Holmbush, 19s.

Hingston, 7s. 6d.

Leadhills, 23 18s. 9d.

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Panty Mwyn.

North Laxey, 4s.

Pandora, 12s. 6d.

Parys Mountain, 10s.

Pateley Bridge, 22s.

Penrith, 6s.

Roman Grav., 27 18s. 9d.

Rookhope, 18s. 6d.

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Van, 22s.

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Wye Valley, 37s. 6d.

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Tecoma, 3s. 6d.	Yorke Peninsula, 5s. 6d.	

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Flagstaff, 15s.

Frontino, 17s.

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Grogwinion, 3 1/2

Great Laxey, 20 1/2

Leadhills, 9

Herodsfoot, 10s.

Hingston, 10s.

Last Chance, 3 1/2

Ladywell, 17s. 6d.

Leadhills, 12s. 6d.

Marke Valley, 4s.

North Laxey, 4s.

New Quebrada, 10s.

New Zealand Kapanga, 1 1/2

Panulillo, 1 1/2

Parys Mountain, 10s.

Pateley Bridge, 27 1/2

Penrith, 6s. 6d.

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Rookhope, 17s.

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South Condurrow, 9 1/2

Tankerville, 3 1/2

Tincroft, 11

Van, 27

West Chiverton, 14

West Pateley Bridge, 1 1/2

West Godolphin, 1 1/2

West Tankerville, 16s.

West Wye Valley, 3 1/2

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Wheal Kitty, 1 1/2

Wye Valley, 1 1/2

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MINING.—Eberhardt, Port Phillip, Pumas Eureka, Kapanga, Hultafall, Ala-

millios, Linares, Cape Copper, are worth attention. Also, Leadhills, Roman

Gravels, Grogwinion, West Wye Valley, St. Harmon, and Devon Consols.

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60 Chontales, 13s. 9d.

50 Cambrian, 12 10s.

10 Caron, 22 8s. 9d.

40 Condes of Chili, 14s. 9

20 Chicago, 21 12s. 6d.

75 Don Pedro, 11s.

20 Devon Cons., 23 6s. 6d.

15 Eberhardt, 22 15s.

30 East Caradon, 12s.

100 Exchequer, 4s. 3d.

20 Frontino, 42 1s. 3d.

50 Flagstaff, 16s. 3d.

15 Gorsead & Merl., 25s.

10 Great Laxey, 21 5s.

20 Grogwinion 23 15s.

20 Glenroy, 18s. 9d.

10 Hultafall, 24 15s.

10 Hornachos.

25 Hingston, 10s. 6d.

25 Last Chance, 17s. 6d.

30 Llanrwst.

25 Leadhills, 24 2s. 6d.

20 N. Quebrada, 22 2s. 6d.



## Lectures on Practical Mining in Germany.

## CLAUSTHAL MINING SCHOOL NOTES.—No. LXI.\*

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,  
Certificated Mining Engineer.(Formerly Student at the Royal Bergakademie, Clausthal).  
[The Author reserves the right of reproduction.]

## SECTION III.

Chubb's coal wedging machine appears to be somewhat unwieldy and long for extensive use in collieries, and the difficulty of keeping the numerous pistons perfectly water tight, and in proper working order, is an obstacle to its use in the hands of ordinary colliers.

In 1869 an hydraulic coal press was brought out by Bidder and Jones, and appears to be the most practical coal press yet brought out. The apparatus consists of two chief parts—the pump and the wedge and wedge holders. As in all these apparatus, it is intended to be inserted in a hole, which has been already drilled or bored out. As the holes are comparatively large, this must be done by means of a spiral borer, as in the case of Chubb's machine. The pump of Bidder and Jones's machine is arranged in two parts—the pump itself (somewhat similar to Tangye's pump), to which a cylinder of about 3 in. internal diameter and 18 in. stroke is attached. This forms the cylinder of the hydraulic press. The machine has been made in two sizes, for 4 in. and 5 in. bore holes; the diameter of the hydraulic cylinder remains the same for each, but for the first the total pressure on the piston amounts to about 33,000 lbs., and for the larger bore hole to 55,000 lbs. The piston, or ram, of the force pump is about  $\frac{3}{4}$  in. in diameter, the force pump and the hydraulic press cylinder forming one casting, which can be detached from the rest of the apparatus. This has the advantage that less outlay is required in furnishing a colliery with this apparatus than with others, since the same pump and press cylinder could be used for several sets of wedges and holders. The other portion of the apparatus likewise consists of two portions—the wedges and the wedge holder or strap. The strap consists of two long flat pieces of steel, which are joined together at one end by a semicircular piece, the opposite ends terminating in T-shaped pieces. These ends slip into notches in a ring attached to the press cylinder. A hemispherical block of iron, with a groove in it, in which the semicircular portion of the strap fits, is inserted at the back end of the strap and bears against the bottom of the bore hole. The wedges used are not single but double sets of wedges. They are inserted between a pair of cheeks of the same length as the wedges, and which abut against the hemispherical block at the bottom of the bore hole. The wedges when closed together form a cylinder, about 15 in. long and 3 in. diameter, with two grooves running along the line between the two halves. Each groove, therefore, is formed half in the one cheek and the other half in the other. These grooves are of such a size that the steel straps from the press cylinder fit them exactly. When the apparatus is to be used the steel straps and side cheeks are first inserted in the bore hole, and a wedge (consisting of two halves) is inserted with the end just within the two cheeks. The press and force pump are then inserted in the bore hole, or rather the cylinder of the hydraulic press is partly inserted; the force pump and a portion of the press cylinder projects outside beyond the bore hole. When the handle of the force pump is worked the ram of the press cylinder acts directly on the wedges, forcing them between the cheeks and the latter apart. When the wedges have been driven to the end of the cheeks, and the loosening of the coal has still not been effected, the water pressure is relieved from the back of the piston by the means of a small cock, and the ram is pushed so far back that a second wedge can be inserted between the front ends of the first two (half) wedges. The forcing in of a second wedge will in almost all cases effect the loosening of the coal. At the Harecastle Colliery, in Staffordshire, where the machine was tried, it is reported that though the cost of getting was increased this was more than covered by the increased quantity of large obtained. It appears to have been tried in a 7-ft. seam of coal, the upper 2 ft. being got by hand, the remainder being obtained by the machine, which was inserted in a nearly vertical hole, bored about 5 ft. from the loose end.

SECTION V.  
ON GRUBENBAU.

GRUBENBAU is a German technical term for which we have no equivalent in the English language; we are compelled, therefore, to retain the term, its comprehensiveness being one of its chief recommendations. We will, however, endeavour in the present number to give our readers a clear idea of its meaning. It may be said to comprise every operation or work which has for its object the resisting of the weight, or rather pressure, of the strata, and also that of water.

Such pressure may originate simply from the weight of the strata which have been undermined, and in fact does in almost all cases so originate; there are, however, many circumstances which modify or alter the pressure to a considerable extent. The most important of these is the cohesion of the rock masses themselves. It is this which acts as a support against the pressure, and, as will be evident, the total amount of support which thus acts against the fall of any given portion or weight of strata is dependent on the section of rock which has to support or carry the weight. The cohesion of the strata has two different kinds of strain to support. In the case of pillars left to support a great weight of roof, or in vein mining, where a great part of a lode is got, those portions which are left will have a crushing strain to bear. On the other hand, where a portion of strata or mineral has several free faces, as for example in a coal mine, where the coal has been undercut and also cut at the ends, the mass of coal will be supported in two planes only, along the roof and at the back; in the first plane the cohesion of the mass will have to resist a tensional or pulling strain, the back face will be subject to both a tensional and shearing strain. The strata, however, are seldom uniform in texture, and the cohesive force in almost all cases will be found to be different in different directions. This, we have pointed out in Section I., is the case with coal, and in most stratified deposits the cohesive force is less along the planes of stratification than in other directions. Besides this the cohesion of a large mass of rock or portion of strata is often interrupted by slips, cracks, clefts, &c., in the strata, and if these are of any extent, so as to give a sliding surface, the vertical pressure of a rock mass may readily show itself in different portions of a mine as a side pressure, and in rare cases even as an upward pressure. The cohesive force is greatest in compact rocks, such as sandstone, grauwacke, limestone, and granite, which as a rule require little or no support, and is less among the more regular stratified slates, shales, &c. In such rocks the cohesion is greatly affected and lessened by the weathering action of the air currents traversing the mine, and in some the cohesion may thereby be completely destroyed. Some strata, such as surface alluvium, sand, loose conglomerates, and the like, appear to have no cohesion whatever, and will fall down in any direction in which its weight may have a tendency to carry it, so long as there is any empty space into which it may fall. Such strata are not often the object of the miner's search, but are by no means unfrequently met with in mining operations.

It very seldom occurs that the strata in which the mine is worked are perfectly free from water, though in very deep workings the amount is often exceedingly small. The presence of water in certain strata, such as clays, marls, and the like, which when air is present (which will always be the case where mining operations are carried on) swell and increase considerably in volume, and this too with such a force that no support or lining will be able to withstand. In such a case the pressure will often be found to come from

beneath. If the amount of water which makes its way to a mine is very considerable it will exercise a pressure on any portion of the strata which acts as a dam to its further progress, and the pressures will be proportionate to the head of water held back by the strata. In many cases the strata through which the water passes will lose all cohesion, owing to the presence of the water, and a semi-fluid mass will be produced. In such a case the water pressure will be increased by that of the strata held suspended in it, and such masses naturally offer the greatest impediments to the miner. The relative increase in pressure in such a case is directly proportional to the relative increase in the specific gravity of the semi-fluid mass.

Grubensbau, then, comprises all those arrangements and operations which have for their object the resisting of pressure, which may originate from any of the above causes, though in many cases this may be but a secondary consideration. The term, then, includes timbering in levels, workings, and shafts; masonry work in shafts and levels; the water-tight lining of shafts, levels, &c. This latter includes the penetrating of water-bearing quicksands either by shafts or levels.

There are several ways in which this pressure of the strata can be either lessened, avoided, or resisted. This may, according to H. Berggrath Lottner, be accomplished in the following manner:—

1.—By choosing smaller dimensions, and giving to the levels, shafts, &c., the most suitable forms. By so doing one can in many cases cause the natural tension of the rocks and their cohesion to act against the weight of the masses and the pressures which it produces. For this purpose the levels are driven of small dimensions, so as to destroy as little as possible the natural connection of the strata in the neighbourhood of the levels, and the roof is made, when possible, narrower than the floor, as it is chiefly the roof which has least natural support and most weight to carry. Of all forms the circular is in itself the strongest, and for this reason it is usual to sink circular shafts and to arch the top levels. In driving levels, or drifts, those which are driven at right angles to the strike line—i.e., the lines of cleavage—are, as a rule, the strongest, and require least timbering; on the other hand, those which follow the lines of cleavage are the cheapest to drive, but the sides are more liable to break off along the lines of cleavage, and hence to require more timbering.

2.—This pressure may be supported by leaving part of the deposit which is being worked as pillars of considerable size (length, &c.) under canals, water levels, principal cross-cuts in massive deposits, and round the bottom of shafts, &c. In single pillars, as in the case of working coal seams, by working only one portion of a deposit, which occurs often in the case of driving levels, and even in working away the deposit in cases where the roof is very faulty, a portion of the deposit may be left unworked to form a good roof.

3.—By means of attle packing, the material used for this purpose must not be liable to crumble or fall to pieces owing to the weathering action of the atmosphere. The material is often obtained in the mine itself, sometimes by purposely working away a portion of the deposit and allowing the roof to break in, the loose slabs of rock being then readily got for packing; in other cases the material must be brought from the surface, in many cases being thrown down special shafts into the mine. The attle packing or filling may be complete—i.e., completely filling up the empty space which is left; this is generally the case when old shafts and levels are filled up to prevent surface damage, though this method recommends itself especially in cases where it is intended to afterwards re-open the shaft and levels, out of which the attle can later be readily filled; or the packing may be only partial, either when a partial support only is required, as in some modes of working, or when there is not sufficient material for packing at hand. In these cases the packing is formed in broad pieces, or separate packs or walls, and in this last form approaches or forms a kind of dry walling. Attle packing is best when formed of large slabs built as closely and tightly together as possible; goat packs, which are only required to support the weight for a short time, are generally filled inside with loose dirt. Attle packing never supports a weight so well as a solid pillar; indeed, the greatest resistance is first offered by the packing after it has yielded somewhat to the pressure, and has thereby become pressed more closely and compactly together.

## THE MANUFACTURE OF PIG-IRON.

By JAMES COLQUHOUN, Tredegar Ironworks.\*

It has been said that iron is the keystone of England's civilisation. No material in nature has done more for the progress of the world, and wherever it is introduced it becomes the pioneer of prosperity, developing trade, opening up new countries, entirely changing quiet pastoral or rural districts into gigantic seats of industry, engaging the researches of the chemist, the ingenuity of the engineer, the skill of the artisan, and giving employment to hundreds of thousands of the human race. It may be asked why iron, which is the most widely diffused of all the metals, and of so valuable a character, was so long coming into extensive use? We do not wonder when we consider that, unlike gold, it is never found in a pure state, except as meteorites, but is always mixed with impurities, and requires extensive appliances in its manufacture and an abundance of fuel, which was not procurable until within the last 100 years. The ironmaster of the sixteenth century selected a spot where there was an abundance of wood and water, and erected his furnace, which only produced from 3 to 5 tons of iron per week, and when the supply of wood became exhausted he had little trouble or expense in removing to a new site. It is necessary for the ironmaster of the present day to expend a large capital on his furnaces, with railway connections and works; but with the perfection reached in the art of ironmaking it is no unusual occurrence for a blast-furnace to make from 3 to 5 tons per hour.

The working of iron, like most of the arts, had its origin in the East. It is supposed that the first furnaces were of a low conical structure, with an opening on the top to admit the ore and fuel, and having openings at the bottom for the admission of air, erected on high grounds, so as to get all the advantage of winds to assist combustion. Afterwards foot-blast would be introduced. The Egyptians were acquainted with the casting of metals, as appears from the representations on their monuments. The drawing (a copy of one from Thebes) of the foot-blast shows the manner employed in urging the fire, and may possibly have been used in reducing ores of iron at a later period. Layard also mentions having discovered iron armour while excavating amongst the ruins of Nineveh. The water blast was afterwards used, and the Catalan forge introduced, in which malleable iron is produced direct from the ore. This forge still exists in some parts of Spain and America, where wood is abundant. The Roman colonists were the first to introduce the manufacture into this country. They established forges in the Forest of Dean and South Wales, and sent the iron to Bristol to be made into weapons for their armies.

Little progress was made for long years after the Roman colonists left this country, and the iron made was so small that large quantities had to be imported from other countries. It is uncertain whether the blast-furnace is a British invention, and no record exists of the date when it was first erected. No iron castings can be traced earlier than the middle of the 16th century. The Romans had established works in Sussex, and it was there that the first indication of a revival took place. That country abounded in ore and immense forests of oak suitable for fuel, and being within a short distance of London, it was the most important and prosperous of all the manufacturing districts, previous to the introduction of coal as fuel. The furnaces did not produce more than from 3 to 5 tons per week, and so limited were the facilities of the ironmaster for executing contracts that the railings around St. Paul's were made by several firms, the contract being considered too large for one to undertake. In the Forest of Dean, Monmouthshire, and Yorkshire furnaces were also established. The iron made was in excess of that required for the country, and large quantities of iron ordnance were exported to other countries. This prosperity was not of long continuance, as the Government became alarmed at the rapid de-

struction of the forests, and several enactments were made in Parliament prohibiting the use of wood within certain districts. Several of the ironmasters removed to South Wales, where they erected furnaces at Aberdare and Merthyr. The severe restrictions against the use of wood caused the ironmasters to find a substitute for the fuel necessary for smelting. Dud Dudley took out a patent in 1620 to use what he termed pit-coal, but after encountering incessant opposition from the ironmasters, died in 1684, and with him died, for a time, the art of making iron with coal. There was a gradual decay for years afterwards, but the constantly increasing wants of the country set the ironmaster to look about for other fuel besides wood. For nearly 100 years after Dudley succeeded in using coal the manufacture declined, and no revival of any importance occurred till 1720 or 1730. Mushet states that 59 furnaces were in blast at that period, making annually 17,350 tons, or little more than 5 tons of pig-iron per week for each furnace. From this time a new era may be said to have commenced, the produce rapidly increasing every year. The discovery of the steam-engine furnished greater blast-power, and enabled the furnaces to be constructed of larger dimensions. Atmospheric engines with blast cylinders were first employed. The earliest of any magnitude is supposed to have been erected by Smeaton in 1760, at the Carron Ironworks. About the beginning of the present century Watt introduced his engine, which gave an impetus not only to the iron trade, but to almost every other industry. By it the mines of ore and coal were enabled to be worked from greater depths, and the ores were smelted in the blast-furnace with greater facility. In 1801 Mushet discovered the black band, and from this date the manufacture of iron rapidly increased in Scotland.

The discovery of the hot-blast marks another and very important era. Neilson took out a patent in 1828 to heat the air before entering the furnace. The apparatus first employed was very crude, and it was not till Condie invented the bent or horse-shoe pipe that any marked success attended the invention. The first experiments were made at Clyde Ironworks, and Mr. Dunlop, the proprietor of these works, informs me that previous to the introduction of the hot-blast there were 8 tons of coals consumed in the furnace per ton of iron, but when the bent pipe was introduced, about 1835, the consumption fell to 2 tons 6 cwt. in the furnace per ton of iron made. The great saving in Scotland was effected through the use of raw coal, and in a few years the iron industry there increased rapidly. Besides saving fuel, the hot-blast process also increased the make by more than one-third, and a blowing-engine was able to blow four furnaces in place of three with cold-blast. The next great improvement was the utilisation of the waste gases—said to have been first tried in France—for raising steam for the blowing-engines, and for heating the blast. The introduction of this system has been the means of saving in the Cleveland district alone upwards of 500,000 tons of coal per annum. It is now applied to almost every ironworks in the United Kingdom and abroad. Another great improvement was in increasing the capacity of the blast-furnace, the modern furnace has assumed colossal proportions. The furnaces should be built to suit the character of the ores to be smelted, and the mechanical structure of the coke. Where the ore is finely divided, or the coke weak, very high furnaces are not suitable. Errors have been made in this respect, and furnaces in Lancashire and South Wales have been blown out and their height reduced. It has been found in practice that a mere increase in the capacity, without a corresponding increase in height, does not give the greatest economy in fuel, and that no appreciable advantage in the cost of making iron is gained by raising the furnaces in Cleveland beyond 80 ft., in South Wales and Scotland 60 ft., and in the Lancashire and Cumberland districts 60 ft. Such is a condensed history of one of the most important industries of this country; an industry, perhaps, that is subject to more fluctuations and depressions than any other, yet one that has been growing in magnitude to meet the increasing demands of the world, for half a century, till it has reached the large production of between 6,000,000 and 7,000,000 tons per annum.

Mr. Colquhoun gave some valuable tables showing the increasing annual make per furnace from 1740 to 1876, and the present estimated production of the various countries of the world. He then went on to state that ores of iron are found in every quarter of the globe, and are so numerous that we can only glance at those principally used in this country. The argillaceous ores are largely used in North and South Staffordshire, Scotland, Derbyshire, Shropshire, and Yorkshire. This is the most important British ore, the quantity raised being more than half the produce of the United Kingdom. The best hematite ores are those in Lancashire and Cumberland, where they are found in irregular deposits in the carboniferous limestone. Enormous deposits of iron are being extensively worked in Spain, principally in the Bilbao district, those of Somorrostro being very pure. The Lancashire, Cumberland, and Spanish ores are in great request for making Bessemer pig. The brown ores are found in the Lias, Oolite, and Lower Greensand formations. In Cleveland the stone is worked from 12 to 18 ft. in thickness. The manganese ores are imported from Spain, and used for the manufacture of spiegeleisen. Analyses showing the composition of these ores were also given. Mr. Colquhoun next observed that all the ores contain more or less impurities, these being principally silica and alumina, and are infusible in the blast-furnace. The object of the smelter is to obtain all the iron in the ore, and for this purpose it is necessary to put into the furnace some ingredient that will readily combine with the silica. The flux employed for this purpose is limestone. Where the Lancashire and Cheshire hematites are used alone it is found advantageous to add a small proportion of aluminous ore. This is found in abundance in Belfast.

The argillaceous, oolitic, and some other ores are subjected to a process of roasting or calcining before smelting. This removes the water, carbonic acid, and other volatile matters, and if the temperature be high the sulphur is volatilised. The ores are thus reduced in weight, and are in better condition for the changes which they undergo in the process of smelting. Roasting in open heaps or clamps is still practised, principally with blackband and argillaceous ores. The most economical method of calcining is by the kiln. In South Wales the elliptical shape is used, the length being about 20 ft., and height 20 ft., built of massive stonework. In the Cleveland district the kilns are made of a cylindrical form, cased with malleable iron plates, and lined with brickwork 12 in. in thickness. The interior diameter of the kiln is 24 ft., the cubic capacity about 8000 ft.<sup>3</sup>, and is tapered inwards at the bottom. To guide the ore towards the openings at the bottom there is placed a central cast-iron cone with its apex upwards. It is capable of calcining from 700 to 800 tons per week with a consumption of 1 ton of coal to about 25 tons of stone.

In an elementary paper like this it would be impossible to enter into all the details of the construction of a blast-furnace plant, and our remarks will, therefore, be of a short and general description. Durability and simplicity are the most essential points to consider in the construction of an ironworks. It is of the utmost importance to secure a good foundation for the blast-furnace. If the ground consists of clay a foundation of concrete is put in, about 6 ft. deep. On the top of this a circular base of fire-brick is built 8 ft. deep, the bottom of the furnace consisting of two courses set on edge, the lower of fire-brick blocks 2 ft. deep, and the upper of fire-brick or coarse sandstone 3 ft. deep. The brick piers rest upon this base, and are carried up to a height of 24 ft., having strong cast-iron lintels over the openings. The whole of the structure from this point is cased with malleable iron plates, varying in thickness from  $\frac{3}{4}$  in. at the bottom to  $\frac{5}{8}$  of an inch at the top. The furnace is lined inside with fire-brick blocks 5 in. thick, and are made of different sizes to suit the varying diameter, and is so constructed that the inside lining can be removed when burnt out and relined without affecting the structure. The hearth is 8 ft. diameter, bushes 23 ft., and total height of furnace 80 ft. The diameter of the throat is 11 ft. 9 in., and the cubic capacity about 20,000 ft.<sup>3</sup>. The furnace is blown with four tuyeres having nozzles  $\frac{4}{5}$  to 6 in. diameter. The tuyere is a spiral tube of wrought-iron, set in a casing of cast-iron, through which a constant stream of cold water passes. The front of the furnace is protected by a tymplate, and cast-iron blocks are placed around the hearth and plates above the tuyeres, through the whole of which a stream of water

\* Being Notes on a Course of Lectures on Mining, delivered by Herr Berggrath, Dr. von Gneiss, Director of the Royal Bergakademie, Clausthal, Thuringia, North Germany.

† Section IV., on the Different Modes of Working, was taken before this; we shall, however, find it more convenient to take this section after No. III.

\* A lecture delivered at the Bristol Mining School, on Monday, Feb. 18.



is constantly flowing. The bell and hopper, or cup and cone, will be understood from the drawing.

It consists of a cast-iron cone suspended at its apex by a chain, which presses against the bottom of the cup, preventing the gases from escaping. The cone is suspended by a lever carrying a counter balance at the other end. The raising or lowering is effected by a rack and pinion. Wrightson has invented a hydraulic lowering apparatus, which is working in many ironworks successfully. The importance of careful charging, so as to give regularity in the working of the furnace, has long been known, and the introduction of the cup and cone has been found a great improvement.

(To be continued in next week's Journal.)

#### GEOLOGICAL SOCIETY OF LONDON.

Feb. 6.—Prof. P. MARTIN DUNCAN, M.B., F.R.S. (President), in the chair.

Jas. Adey Birds, B.A., Gloucester-terrace, Hyde Park; Rev. George E. Comerford-Cassey, M.A., Cromwell-street, Nottingham; Lieut.-Col. H. H. Godwin-Austen, Shalford House, near Guildford; Sir Wilmoughby Jones, Bart., Cranmer Hall, Fakenham, Norfolk; and Henry Richard Ladell, M.A., London International College, Isleworth, were elected Fellows of the Society.—Henry Edward Richard Bright, Cape Town, Cape of Good Hope; George James Cotton Broom, C.E., North-street, Wolverhampton; William James Farrer, Upper Brook-street; George Scumell, Great George-street; and Joseph Fletcher White, Wakefield, Yorkshire, were proposed as Fellows of the Society.—Jas. W. Carrall, Tientsin, China; Edward Clemenshaw, M.A., F.C.S., King's School, Sherborne; Percy John Neate, Belsize Park, Hampstead; Arthur Nicols, Church-row, Hampstead; John Snell, Pydar-street, Truro; and John Spencer, Crawshaw Booth, Rawtenstall, Manchester, will be balloted for as Fellows of the Society.—The following communications were read:—

- 1.—"On some Foraminifera from Pleistocene Beds in Ischia," by M. Ernest Vanden Broeck. Preceded by some geological remarks by A. W. Waters, F.G.S.
- 2.—"On the Influence of the Advent of a Higher Form of Life in modifying the structure of an older and lower Form," by Professor Owen, C.B., F.R.S., F.G.S.
- 3.—"Notes on a Crocodilian Jaw from the Coral Rag of Weymouth," by E. Tully Newton, F.G.S., of H.M. Geological Survey.
- 4.—"Note on Two Skulls from the Wealden and Purbeck Formations indicating a new Subgroup of Crocodilia," by J. W. Hulke, F.R.S., F.G.S.

#### MINERALOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

A general meeting of this society was held in the rooms of the Royal Microscopical Society, at King's College, on Tuesday evening, Feb. 19, the President, Mr. H. C. Sorby, F.R.S., in the chair. There was a good attendance of members, and several visitors.

The President read a valuable and important paper "On the Determination of the minerals in their sections of rocks by means of their indices of refraction." In this paper he showed that the refractive indices might often be determined with great accuracy in sections cut for ordinary microscopic purposes and less than 1-300th of an inch in thickness.—The Rev. T. G. Bonney then read a paper "On some specimens of Gabbro from the Pennine Alps," in which he pointed out the great changes which those rocks had undergone, and their similarity to the rocks of Crousa Down and of Coverack in the Lizard peninsula, Cornwall.—Mr. J. H. Collins read a paper "On mineral classification," in which he advocated a primary chemical and a secondary mixed system of classification. This paper elicited an interesting discussion.

Specimens in illustration of their papers were exhibited by the President and by the Rev. T. G. Bonney. Specimens of minerals from new localities in Cornwall were exhibited by Dr. C. Le Neve Foster.

#### ON THE RESOURCES AND FUTURE DEVELOPMENT OF THE COAL FIELDS OF EUROPE.\*

(Concluded from last week's Journal.)

**AUSTRIA.**—The largest deposits of fuel are found in Bohemia, where there are important beds of coal and lignite, at present worked on a small but rapidly increasing scale. In Moravia, on the banks of the Oder, and its tributary, the Ostrawitz, and also in the districts of Rositz and Oslawan, coal mining is extensively carried on. Coal is also worked in Austrian Silesia.

**BELGIUM AND FRANCE.**—The Belgian coal fields unite with those of the North of France to form one field with an area of some 1200 square miles, commencing at Aix-la-Chapelle, in Prussia, and running through Liège, Charleroi, and Mons, in Belgium, it enters France at Valenciennes, and continues thence via Douai and Lillier to Boulogne. The Belgium portion of this field is pretty well developed, and may be divided into—

- 1.—The Mons basin, producing a good coking and gas coal, chiefly sent to Paris.
- 2.—The Charleroi basin, intermediate in quality between the last and the next.
- 3.—Liège basin, free burning coal.

The French portion probably admits of the greatest future development, but the expense of mining consequent on the contorted nature of the beds and the limited area will never allow of any great output. Further south lie the coal fields of the Loire and St. Etienne, of limited area, but with a large production. As compared with other countries of Europe, France has but small wealth in coal.

**SPAIN.**—In addition to other great mineral wealth, Spain has large coal fields, and though at present but little known, and with a very small production, they are at some time destined to be of great importance. An excellent coal is now worked in the Linares district in the south, where it is used for iron manufacture and lead smelting, and is said to be equal to the best English coal. Perhaps the most important deposits of coal are found in Asturias and extend along the Bay of Biscay from Santander to the west. The quality of the coal is good, there are several excellent harbours along the coast which will serve some day as convenient shipping ports; further, there is a great abundance of superior iron ore. These advantages must in time make this one of the greatest coal and iron producing districts of Europe, and probably an important rival of South Wales. In the north-east of Spain and some other districts small deposits of coal are known.

**RUSSIA.**—The carboniferous rocks are extensively developed in Russia, and at intervals contain valuable coal beds: the most important of which is probably the coal field north of the Sea of Azof, between the Dnieper and the Don, with an area of about 11,000 square miles. The great natural advantages it possesses in its proximity to the sea coast will enable it some day to supply the trade of the Black Sea, and the navigable rivers which intersect it will afford an easy and cheap transport to the interior of Russia whenever its resources are developed. In fact, this coal field, which is at present mined in a very rude manner in a few places only, appears destined at some future time to become the centre of a larger manufacturing industry than any other part of Russia, for we have here the singularly felicitous combination of abundance of coal and corn, cheap water transport, central position between the markets of Europe and Asia, together with a less severe climate than other parts of the empire. If a spirit of enterprise and industry could only be implanted in the people it would soon take a foremost rank in Europe as an industrial and commercial centre. Another large coal field stretches along the western base of the Ural Mountains from the Arctic Sea to the River Ural. In time it must be of great value as a source of fuel for smelting the rich ores of iron and more precious metals so abundant in these mountains. There are extensive coal fields in the centre of Russia, around Moscow, but the quality is poor. In the Caucasus is also a deposit, while in Poland is a small but very productive coal field on the confines of Austria, Prussia, and Russia, remarkable as containing a very thick coal seam, no less than 16 yards in thickness.

\* Paper read by Mr. W. H. JOHNSON, B.Sc., at the Manchester Geological Society.

**TURKEY.**—Some valuable beds of coal are found in Moldavia, Roumelia, and on the Black Sea, the extent is at present almost unknown, but under a better form of government they will no doubt be rapidly developed. Near Erakli, on the Black Sea, coal was mined during the Crimean War for the use of the combined English and French fleets. In Styria, Northern Italy, Switzerland, and even in Greece, deposits of lignite are pretty extensively worked, but from the inferior nature of this fuel, it will never have more than a local consumption. A little anthracite is mined on the Alps, in Savoy, and Canton Glarus. In conclusion, I have to acknowledge the assistance I have derived from Prof. Hull's work on the coal fields of Great Britain.

The President said he believed it may be taken as a fact, as stated by Mr. Johnson, that ordinarily the best coke came from the North of England; but there are cokes manufactured in Lancashire which would hold their own against the best Durham coke, and by care in the manufacture actually fetched higher prices. Coke might be made silvery or black in appearance, light or heavy, according to the treatment it received in the oven, and on coming out of the oven. Of course there must be a suitable coal for coking.

Mr. JOHNSON, in reply to observations made by Mr. Martin, said that in his opinion the Westphalian coal field would never be anything more than (say) that of North Durham and Northumberland. It would be a number of years before it overtook them. It would not compare in area with the Russian coal field (say) in the neighbourhood of the sea of Azoff, and he believed some of the Bohemian coal fields would develop quite as largely as those of the Ruhr were developed at present. A great deal of money had been laid out there, and a great impetus given to industry through the development of the iron trade.

Mr. MARTIN said he had omitted to mention that the director of one of the Government mining schools estimated the coal fields of Westphalia, as already explored, to contain coal for 800 years, at the present total output of Great Britain. The Brown coal of Bohemia was quite a different article to the so-called Stone coal of the carboniferous measures, and it is not likely to compete with it generally for industrial purposes. It is unsuitable for iron manufacture on a large scale.

Prof. BOYD DAWKINS said he wished to say a word regarding the production of coal in this country. It seemed to him that the statistics regarding our ultimate supply of coal were altogether unsatisfactory. It was undoubtedly true that we had a certain area of coal cropping out at the surface, which we could estimate certainly, and about which there could be no mistake, but to this must be added the coal which was under the red rocks, and the probable extent of the valuable and important coal measures of South Wales, in Somerset, and of Yorkshire, under the secondary rocks of Southern and Eastern England. He thought it extremely probable that as enterprise got developed we should find coal to a larger extent than was at present suspected. He would not be surprised at their finding enormous supplies of coal under the south-eastern districts of England. It is true that the exploration in the Weald, near Battle, failed, but everybody knew that to sink a shaft for the coal measures under the secondary rocks was like letting down a line to fish in the sea. They did not catch a fish, but he had no doubt that if some half-dozen or so further attempts were made, one or more would be successful. He believed they would hit the coal field, so important in South Wales, which cropped up in the neighbourhood of Bristol, and was really a continuation of the important and valuable field which extended through Belgium into the region of Westphalia. With regard to the general question of the supply of coal, he could not help believing that the enormous fields in the United States contained by far the largest supply of coal of any part of the world. He looked upon that region as the ultimate centre towards which all enterprise would gradually converge.

#### SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE INSTITUTE OF MINING ENGINEERS.

The eleventh annual meeting of members was held at the Geological Museum, Dudley, on Monday. Mr. THOMAS PARTON, F.G.S., occupied the chair at the beginning of the business, and was supported by Mr. W. NORTH (Mayor of Dudley), acting as vice-President, ten members of the council, and about 60 members of the Institute.—The report of the council showed that the year had been one of progression—12 meetings had been held during the year 1877, and 17 new members had been elected, making a total of 245. There was a falling off in the revenue, due to the depression in trade. The receipts were 171l. 9s. 1d., or 120l. 19s. 4d. less than the previous year. The total expenditure was 234l. 3s. 4d., 55l. 13s. 1d. more than the previous year. The report was adopted.—The report of the scrutineers (Mr. William North, Mayor of Dudley, and Mr. H. Johnson) showed that Mr. David Peacock had been elected President, and Mr. H. Johnson vice-President. It was explained that in consequence of the inability of Mr. Peacock to accept the office there was a second ballot, and Mr. Wm. North was chosen President, with Mr. Johnson as the vice. Mr. Thomas Brettell was re-elected treasurer, and Mr. Alexander Smith, A.I.C.E., secretary. The following gentlemen were elected on the council:—Mr. Parton, Mr. Johnson, sen., Mr. Lindop, Mr. Roper, Mr. Farnworth, Mr. Cookey, Mr. Collie, Mr. Davis, Mr. Meacham, Mr. R. Mason, and Mr. Peacock.

The President regretted that Mr. Peacock was not able to take the high position of President, and then conducted Mr. Wm. North to the presidential chair. Mr. Henry Johnson was also invested in the vice-chair; both gentlemen were received with loud applause.

Messrs. Charles Round, Tipton; H. F. Griffiths, Deepfields; W. Wardle, St. Helen's; R. H. Norton, St. Helen's; W. B. Brown, Liverpool; and Stephen Humble, Derby, were elected members. The newly-elected President then explained that he could not deliver an inaugural address, in consequence of having been elected so recently as Saturday night. He had the greatest possible pleasure in moving a vote of thanks to Mr. Parton, who had worked hard, by attention and the reading of papers, to secure the success of the Institute. (Applause.) The President concluded by thanking the meeting for the honour done him.—Mr. JOHNSON seconded the vote, and also paid a high compliment to Mr. Parton for his arduous efforts during the past year.—Mr. PARTON replied, and said that, so far as the real work of the Institute was concerned, it had not suffered, for the transactions would bear favourable comparison with any other year. He only regretted that the financial condition of the Institute did not appear so favourable. So long as he could he should work, and he begged of the younger members to follow his example, and read papers. Mr. Parton concluded by paying a high compliment to Mr. Blakemore for his valuable papers during the year.—Mr. COLLIS proposed a vote of thanks to the council for the care they had bestowed on the interests of the Institute. He particularly wished to mention the name of the secretary, who had had much work not only connected with the ordinary business, but the excursion.—Mr. HUGHES and Mr. A. SMITH responded.

Mr. Henry Johnson presented, in the name of Mr. Hall, of Stourbridge, some very ancient tools from a surface working at Ambleside. The relics consisted of two wooden shovels shod with iron, the handles, and a pike with but one point; the relics were at least 100 years old. Mr. Dunn said he had heard his grandfather speak of such tools. Mr. Hughes promised an old bottle, Mr. Spruce an ancient jug, and Mr. Parton a pipe.—A vote of thanks was passed to Mr. Hall.

Mr. W. BLAKEMORE, F.G.S., read a paper on "The Green and Igneous Rocks of the South Staffordshire Coal Field," and this was illustrated by diagrams. Mr. Blakemore dealt with the extent and position of the rock in the coal measures, its intrusive character, and the sheets at different horizons. The paper was most exhaustive, and dealt with the field from Rowley in the south to Wyrley in the north. Barrow Hill was not touched upon, the reader promising to deal with the subject in a future paper. He said the phenomena of the green rock had led to the impression that there was more than one sheet of it, but his gathered information did not favour that theory. There were three kinds of igneous rock—basalt, green rock, and of light-coloured trap, but they were all the same. Mr. Blakemore also exhibited microscopical preparations of the basalt, and these were much admired.

Mr. H. H. W. RADCLIFFE, telegraph engineer, Birmingham, read a paper on the "Telephone." It explained the principles of the instrument, and the method by which the sound of the human voice, made audible at one end of a wire, is reproduced at the other end many miles away. Referring to its applicability to mining purposes, the writer held that it worked to perfection. In mines it was not only free from all extraneous troubles, but the silence of the grave facilitated the operation of "its still small voice," and it was not necessary in such places to put it close to the ear. Wherever a wire could extend there could the voice be sent. One of an exploring party might carry with him a telephone and a coil of wire on a small drum, paying it out as he went along. He could carry on a conversation the whole time with a person at the pit bottom, or on the surface, and thus keep him advised of everything that was being done. In communicating between officer and works, or surface or underground workings, it ought to be useful. Its application was unlimited. It might be looked upon as a portable and elongated speaking-tube, which could be easily fitted up between any two points where means of communication might be deemed desirable; and to sum up its capabilities in a few words, it could transmit to a distance far beyond the reach of the ear, or of the eye, the words, the tones of the voice, and the distinct and unmistakable articulation of the speaker.

Mr. W. R. WILLS (Rowley) read a paper (illustrated by diagrams) on his Patent Self-acting Caging and Banking Apparatus. He said his paper referred to an invention for facilitating the loading and unloading of mine cages, and he claimed to effect economy both in time and labour. The reader and inventor then described the diagrams, which showed that the empty tubs ran on an incline towards the shaft, and the full ones on an incline away from the shaft; a series of catches, easily worked, enabling the banksmen to retain them in their proper places.

Mr. JAMES MACNAB (London) read a paper "On Improvements in methods of getting coal and other minerals, and blasting or disintegrating rock and other substances." He said the object of his paper was to show how he made the flame of gunpowder harmless and smokeless in fiery or non-fiery mines, and to show the apparatus by which he obtained such results. Water was employed to neutralise the dangerous gases emanating from gunpowder. Water extinguished the flash and absorbed the gases the instant after ignition. The presence of water, too, gave extra power, and so there was economy as well as safety. After the face of the coal had been "holed" a cartridge of gunpowder (with the top opened to secure ignition) was placed at the far end, and then a cartridge filled with water followed it, then tamping of 2 in. of soft clay. The ordinary copper skewer was forced through the soft clay and over the water cartridge to form a groove or vent-hole to lead the spark in initial charge to the powder. The skewer having been withdrawn, a safety plug should be inserted. The plug was a circular wedge-shaped head or breech chamber, screwed on the end of a tube and striker. The chamber or holder contained detonating shell and loose powder, and was forced into the vent hole. The rear end or cylinder containing the striker projected from the coal face, and cocked or pulled out, and caught by a bolt which was connected with a wire or cord line for withdrawing. The moment the bolt was released the charge ignited, and both gunpowder and water did its work. The reader declared that with his system he had obtained all results and saved powder. He mentioned collieries to which he had experimented with success, particularly the Stanton Colliery, Swadincote, Derbyshire. He had also experimented by placing the powder, then clay, and then water, and the result had been a success. In conclusion, the reader said he hoped by the mechanical portion of his system to rival the simultaneous firing of electricity.—Mr. DANIEL ROSE, of Wolverhampton, having exhibited and explained the principles of an improved safety-lamp, the business meeting terminated.

#### WATER-GAS—THE FUEL OF THE FUTURE.

The acceptance of a statement as true cannot always be taken as evidence of the hearer's concurrence with the views of the speaker, for it has been mentioned that a mediocre, and at the same time very egotistic, author once declared—"My writings will be read, my dear fellow, when Shakespeare and Milton are forgotten." His friend admitted the fact, cruelly adding, however—"But not till then." And so it is with water-gas. That it may be the fuel of the future need not be denied, but it must be well understood that it can only be the far future that is referred to. The general utilisation of water-gas is, perhaps, somewhat less chimerical than the production of perpetual motion, or the perfection of aerial navigation, but is certainly not many degrees removed from them in impracticability. And the accuracy of this view is demonstrated by an analysis of the reports prepared in favour of the water-gas scheme in the United States.

In the first place it is extremely questionable, to judge from the report of Mr. George S. Dwight, whether either the Lowe gas or the Strong gas are water-gases in the ordinary acceptance of the term, both being rather a clean description of coal gas produced by a method which, unless in very exceptional cases, would be far less economic than those ordinarily employed. Secondly, Prof. Gideon E. Moore, Ph.D., learnt only by mere hearsay that the gas he examined was made by the Strong process at all, and for all that can be ascertained from his report it might have been manufactured, purified, or enriched by any process whatever, so that no useful conclusions can be drawn from his report. And lastly, Dr. H. Wurtz's report is of the suppressio-suggestive character which carefully conceals the real points at issue.

The gas taken by Prof. Moore on Oct. 21, was made the day before his visit, and he had only the inventor's assurance that no lime had been used, or other purifying agent, except the water in the hydraulic main. Now, without unfairly questioning the inventor's veracity, it must be stated that analyses based upon samples so carelessly obtained are of little value. Besides this, Prof. Moore did not analyse, or otherwise ascertain, the composition of the coal from which the gas was alleged to have been made, but regards as sufficient for his purpose an old analysis by Dr. Percy, of London. Prof. Moore saw some gas made on Dec. 23, but he merely determined the sulphur in this, and found that it contained 12.96 grains of sulphur in the 100 cubic feet of gas. For drawing a comparison, Prof. Moore takes the inventor's estimate of coal used to produce 1000 cubic feet of gas, and the theoretical heating effect, and concludes therefrom that the gas will produce the full heating effect of the coal consumed in making it. The theoretical heating effect of coal-gas is about 2½ times that of the Strong gas; but as pea and dust coal can be used for the latter it is more economic.

The objections to water-gas in general on account of its contents in carbonic oxide are, Professor Moore points out, based on an entire misconception of the meaning of the reports of the eminent scientific men who were called to pronounce upon the question of its safety in France. The French report was, he says, unfavourable, because the gas was not saturated with illuminating hydrocarbons, and was consequently inodorous; it was not of itself luminous, but was employed to heat to intense whiteness small cages of platinum, which were suspended in the flame and furnished the luminous body. Being inodorous, the escape of the gas could not have been detected, hence the dangers arising from accidental leakage were excessive. If the Strong gas be made luminous, it must, like the Lowe gas, receive a strong and characteristic odour. Herein lies, also, the only element of safety in the use of ordinary coal gas, 1-10,000 of which can be detected in air by its odour. Coal gas, if inodorous, would in all respects be as dangerous for domestic use as pure carbonic oxide gas.

But the strongest condemnation of the Strong gas is that administered by Dr. Henry Wurtz, who states that among American chemists he has for ten years stood virtually alone as a declared advocate of water-gas, and then he assumes that one-fourth of the Strong gas will reach the consumer as carbonic oxide, yet curiously enough he declares that for equal volumes the Strong "gas is over 40 per cent. heavier, and yields some 40 per cent. more light, than gas from good caking coal. Deferring precise calculations for the present it may be briefly stated that the vitiation of the air of a room for equal amounts of light could not with your gas be more than two-



absent. I and my colleagues were indignant at the deceit practised on us, and I called on Mr. Manbey to retain his seat, as the pledge had not been redeemed. After a few seconds' silence Mr. Manbey rose and said, "Mr. Vincent gave his guarantee for 60l. Upon those terms the ballif was withdrawn, but the guarantee was discoloured. Perhaps this is what Mr. Vincent understands by giving money." His default will probably cause the amount to be added to the next proceeding against the company by the same creditor. His assertion that the costs of the petition (20l.) were "personally paid by himself" is not in harmony with the fact. They were paid by a shareholder. All that he did in the matter was to make himself liable for 2l. 2s., for the payment of which several applications have been made—in vain. I do not think the shareholders will be wile to entrust their money to such hands.

E. PEARSON.

[For remainder of Original Correspondence see this day's Supplement.]

dividend stock closed 5 1/2 to 5 3/4.

THEY also announced that the Great Western dividend we now know the result of the working of all our home railways, Scotch excepted. Considering the depression of trade, the dividends received by the proprietors cannot but be regarded as highly satisfactory, the cheapness of coal and iron neutralising the badness of the times. The North Western, Midland, and Great Western maintain their position, but increased preference charges have reduced the 3 1/2 per cent. on North-Eastern stock to 3 1/4 per cent. that of the Great Northern to 3 per cent. The Great Eastern Company have increased their rate 3/4 per cent., Sheffield 1 per cent., Metropolitan 3/4 per cent., and Brighton 1 per cent. The Metropolitan District was enabled to pay 1 1/2 per cent. more on the Preference stock. From a circular issued by the Great Western Colliery Company it appears that the direc-



tors are desirous of reconstructing the concern. Such an arrangement would relieve the company of the yearly necessity of paying a large interest on debentures, and would obviate any possible difficulty by arising from certain shares that were issued at a discount.

**FRIDAY (Opening).**—A sensible recovery is shown from yesterday's depressions. Russian, 1875, are 1½ higher, at 84½, and Consols have recovered to 95½, buyers. In railways there is a general improvement of ½ per cent. Colliery shares are thus quoted:—Chapel House, 2½ to 2½; Newport Abercrombie, 4 to 4½; Thorp's Gawber, 2½ to 3; Allant, 4 to 4½; Great Western, 2 to 2½; Cardiff and Swansea, 1 to 1½. In mining shares some enquiry exists for Llanrwst, Port Phillip, Don Pedro, Leadhills, and Rookhope. Eberhardt, 6½ to 6½. Richmond, 7½ to 7½. Flagstaff, ¾ to 1. Kapanga, 1 to 1½. Don Pedro, 8s. to 10s. Port Phillip, 12s. to 14s. Gold Run, ¾ to ¾. **Two o'clock.**—Prices are hardly so good, a relapse having taken place in Caledonian, Brighton A, Great Western, and one or two others. Consols at one time gave way, but are now 95½ to 95½, as before. Russians have receded to 85½. Egyptian Preference are 48½ to 49, and the United 27½ to 27½. Business has been done in City Offices at 12½, in Eley Brothers at 30½, Foster, Porter, at 21½, and in Royal Aquarium at 5½. Cook's Kitchen, 2½ to 3. Derwent, 1 to 1½. Devon Consols, 3 to 3½. Glenroy, ¾ to 1. Glyn, ¾ to ¾. Leadhills, 8½ to 4. North Laxey, 3s. to 5s. Aberdant, 3s. to 5s. **Four o'clock.**—East London Railway stock has been little affected by the announcement that the directors cannot pay any interest on the debentures. The ordinary stock cannot be sold for much over 13. Lead mining shares are thus quoted:—Herodfoot, 9 to 10; Pateley Bridge, 2½ to 3; Minera, 12 to 14; Lisburne, 50 to 55; Roman Gravels, 7½ to 7½; Rookhope, 17s. to 19s. **FERDINAND R. KIRK.**

### ELECTRO-DEPOSITION OF NICKEL.

The electro-deposition of nickel has usually been attended with considerable difficulty owing to the nature of the metal, but a method for the preparation and preservation of an electro-depositing nickeliferous solution, has been discovered by Mr. JOHN UNWIN, of Sheffield. By this invention he is enabled to deposit the nickel in a pure or slightly alloyed state upon iron, copper, and other metallic and conducting surfaces, and also to keep such solution in good working order, and restore it to good condition when out of order through its contamination with foreign matters derived from the anode. His first object is to obtain a pure double sulphate of nickel and ammonia. To do this he first prepares a solution of sulphate of nickel, by taking three parts of strong nitric acid (Sp. Gr. = about 1.400), one part of strong sulphuric acid (Sp. Gr. = about 1.840), and four parts of water, all by measure, mixing them cautiously, and about half filling an open earthenware pan with the mixture. To every gallon of this mixed acid he then adds about 2 lbs. of ordinary grain or cube nickel, and heats the liquid by a sand bath or other suitable means. If during the process of solution the action becomes inconveniently violent he moderates it by the addition of a little cold water. If the nickel entirely dissolves (except a small quantity of light black matter), he adds more of it in small portions at a time, and continues the addition at intervals until it is in excess; when the production of red fumes has nearly or entirely ceased, or when the liquid becomes thick and pasty from the separation of solid sulphate of nickel, he adds a moderate quantity of hot water, boils and filters the solution; the deep green liquid so obtained is a strong solution of sulphate of nickel. If from the circumstances of its production he considers that it requires purification, he concentrates the solution by evaporation, until on cooling it yields a considerable percentage of crystals of sulphate of nickel; these crystals he collects, washes with a little cold water, and re-dissolves in a moderate quantity of hot water, filtering again if necessary. When cold the liquid is ready for further treatment. He does not make any claim to originality in this method of preparing the sulphate of nickel by itself, as it is nearly identical with that described by him in December, 1871, but he claims the method of obtaining a pure double sulphate of nickel and ammonia, to be presently described, and in which the sulphate of nickel prepared as explained is employed.

A strong solution of sulphate of ammonia is prepared by dissolving the salt in hot water in the proportion of about 4 lbs. of the salt to each gallon of water, and then filter the liquid if necessary, and allow it to become cold. He then obtains the pure double sulphate of nickel and ammonia by adding the above-described solution of sulphate of ammonia to that of the sulphate of nickel, obtained as described; he does not stop the addition of the solution of sulphate of ammonia when sufficient has been added to combine with all the sulphate of nickel present, but he continues to add it in large excess. He does this because he has discovered that the double sulphate of nickel and ammonia is far less soluble in the solution of sulphate of ammonia than in pure water, so that it is precipitated from its solution in water on adding sulphate of ammonia. He, therefore, continues adding the solution of sulphate of ammonia, continuously stirring, until the liquid loses nearly all its colour, by which time the double sulphate of nickel and ammonia will have been precipitated as a light blue crystalline powder, which readily settles to the bottom of the vessel. He then pours off the liquid from the crystalline precipitate of double sulphate of nickel and ammonia, and washes the latter quickly with a strong cold solution of sulphate of ammonia as often as he considers necessary for its sufficient purification; he does not throw away this liquid after use, but employs it at his discretion for combining with fresh sulphate of nickel, instead of dissolving a further amount of sulphate of ammonia. If he desires to make a further purification of the double sulphate of nickel and ammonia he makes a strong solution of it in distilled water, and adds to the liquid a strong solution of sulphate of ammonia, by which means the double sulphate is precipitated in a very pure condition, and is separated from the liquid by filtration or by other convenient means, and then dried or used direct as may be desired; the liquid strained away can be employed instead of fresh solution of sulphate of ammonia for combining with more sulphate of nickel, or for washing the precipitate of the double sulphate.

Mr. Unwin explains that this method of preparing a pure double sulphate of nickel and ammonia differs essentially from Brookes' process patented in 1869, inasmuch as in the present process he omits the long and tedious evaporations and circuitous mode employed by Brookes to purify his sulphate of nickel, such operations being altogether unnecessary. Mr. Unwin, moreover, washes or re-dissolves and re-precipitates his double sulphate of nickel and ammonia, which operations are not comprised in Brookes's process. The new method also differs from Unwin's process of 1871, as he then mixed the solutions of sulphate of nickel and sulphate of ammonia when hot, and he now mixes them when cold; he then directed the addition of sulphate of ammonia to the boiling solution of sulphate of nickel until he had neutralised all the acid in the solution, and then obtained and purified the double sulphate by cooling and crystallisation; but he now obtains it from its solution by precipitating it with a large excess of sulphate of ammonia, having discovered its very sparing solubility in a solution of the latter salt, which fact he also utilises for its washing and purification. He then prepares the depositing solution (subsequently to be used for the purpose of depositing the nickel) by taking the before referred to crystals or crystalline precipitate of the double sulphate of nickel and ammonia, and dissolving them in hot distilled water, and allowing the whole to cool; he then adds cold distilled water until the solution is of about the specific gravity of 70° by Twaddle's hydrometer, equal to an absolute specific gravity of about 1030 (water = 1000). He then tests the solution with litmus paper. If the liquid is perfectly neutral he adds a very small quantity of sulphuric acid, so that blue litmus paper may be reddened; or he adds a small quantity of solution of ammonia, so that red litmus paper may be turned blue.

Having thus obtained a slightly acid or alkaline solution the liquid is ready for use in the electro-deposition of the metal on the surfaces required in the usual manner. Mr. Unwin does not claim the sole use of acid or alkaline solutions of the double sulphate of nickel and ammonia for the electro-deposition of nickel (for which purpose they have previously been employed), except when the said double sulphate has been prepared as described. To effect the second object of his invention he employs ammonia alum, which he thus uses. He takes about 1 oz. of alum for every gallon of the solution to be purified, and dissolves it in a small quantity of hot water, and adds the solution so obtained to the nickel solution, stirring well to obtain a perfect admixture. If the liquid does not then turn red litmus paper blue he adds sufficient solution of ammonia to cause that effect, and then allows the flocculent precipitate thus produced to settle. He then draws or strains off the clear liquid from the deposit, and uses the former for electro-depositing

in the ordinary way. He also employs for this purpose potash alum or sulphate of alumina, or other suitable compound of alumina, but he prefers the use of ammonia alum.

### MANUFACTURE OF GAS.

A process which should materially lower the price of gas to consumers has been patented by Messrs. T. and T. B. REDWOOD, of Lower Clapton, since they propose to increase the volume of gas produced from coals without diminishing its illuminating power, and to reduce the quantity of sulphur retained in the gas in other form than that of sulphuretted hydrogen. They effect the first of these objects by heating the gas in contact with solid surfaces after the removal of the tar, but while it retains the vapours of liquid hydrocarbons diffused through it, and they effect the second object by heating the gas mixed with steam in contact with masses of plaster of Paris. Coal gas which has been produced in the usual way is subjected, as it issues from the hydraulic main, to a process by which it is deprived of heavy, tarry, and other particles which were held in suspension, while the more volatile of the condensing hydrocarbons are retained in it. This may be effected by using the condensing or separating apparatus of Pelouze and Audouin, of Paris; or the same object may be accomplished by conveying the gas through a cylinder in which there are fans, which are made to revolve on an axis coinciding with that of the cylinder with great velocity—say, at the rate of 1000 revolutions or more in a minute, by which means the suspended particles of tar, with any particles of dust, may by concussion be made to coalesce and separate from the gas and uncondensed vapours. This fanning apparatus may be rendered more effective by having longitudinal projections or ribs on the inner surface of the cylinders, and transverse diaphragms or stops between the fans extending from the axis about half-way to the outer edge of the fans, by which means the gas is more thoroughly broken up, and subjected to concussion. The apparatus used for this purpose should be fixed near to the hydraulic main, and means should be adopted for keeping the gas as it passes to and through the separating apparatus at or near to a temperature of 200° Fahr., so that while the tar and dust are removed the hydrocarbon oils may be retained in the gas.

The gas is then conveyed through an apparatus called a converter, which may consist of an iron cylinder or retort, fixed and heated like an ordinary gas retort, and filled or packed with masses of plaster of Paris. They prefer to have the converter so arranged that it shall consist either of two vertical tubes connected so that the gas shall pass up one and down the other, or of two horizontal tubes placed side by side, and one vertical tube, these being connected together so that the gas entering at the end of one of the horizontal tubes shall pass at its further end into the second horizontal tube, through which it will pass to the vertical tube. These tubes may be heated by one fire, the vertical tube of the last-named arrangement receiving the residue of heat from the flues by which the horizontal tubes have been heated, and being, therefore, less heated than the horizontal tubes. These tubes should be made of cast-iron, and they may with advantage be lined inside with fire-clay. The horizontal tubes may be 10 ft. or 12 ft. long, and the vertical tubes about 6 ft. or 8 ft. long, and 10 in. or 12 in. diameter inside. The vertical tube is to be filled with the globular masses which are intended to break up the current of gas, and present a large surface in contact with it. In making the perforated blocks and globular and other masses they sometimes mix clay or cement with the plaster of Paris for the purpose of increasing their firmness and strength. Perforated discs or blocks of fire-clay, or bundles of iron tubes, 1 in. or 2 in. in diameter, may be used in addition to the plaster of Paris for the purpose of communicating the required heat to the gas. The cylinders being thus filled or packed are to be heated until they and their contents have acquired a cherry-red heat, and this temperature, or one nearly approaching to but not exceeding it, is to be maintained throughout the process, while the gas, as it issues from the Pelouze or other separating apparatus, is to be drawn through them by means of an exhaustor, together with a small quantity of steam, either superheated or otherwise, which should enter the converter with the gas for the purpose of diluting or expanding it. They find it desirable to keep up an exhaustion in the converter corresponding to a depression of 3 in. or 4 in. of water in the pressure gauge, and to keep such a quantity of steam diffused through the gas as shall increase its expansion to a slight extent without reducing the temperature below a dull cherry-red heat, or the point at which the vapours of liquid or solid hydrocarbons are broken up into permanent gases.

By these means the volume of the gas may be increased to the extent of 20 per cent. or more without any diminution, but rather with an increase of its illuminating power, and the quantity of sulphur in other form than that of sulphuretted hydrogen may at the same time be greatly reduced. After treatment as herein described the gas is to be purified from ammonia, sulphuretted hydrogen, and carbonic acid in the usual or any suitable way. In the place of lime other sulphates of oxides of alkaline earths may be made use of, but lime is to be preferred. The use of an exhaustor to draw the gas through the converter is an important feature of the invention, as the gas will endure a higher temperature without any injury to its illuminating quality when at a pressure less than atmospheric than when it is condensed by the application of pressure to drive it through the apparatus. This part of the invention is also applicable when producing gas from petroleum or hydrocarbon vapour by passing it, together with steam, through a converter, such as that described. When the hydrocarbon contains sulphur the converter may with special advantage be charged with sulphate of lime.

### COMPRESSED AIR RECEPTACLES.

In constructing vessels intended to resist great internal pressure, such as hydraulic cylinders or accumulators, receptacles for highly compressed air, shells of locomotives, or other high-pressure boilers, the metal should be put into such a form as to combine strength and toughness to the utmost degree, and jointing by screws, rivets, or welds should be avoided. For this purpose he casts or forges masses of mild steel or of iron in the form of rings, which are subjected to circular rolling, as in the manufacture of wheel tyres. Rings of metal are thus produced with a low projecting flange at each end, which is faced in the lathe, and has one or more V grooves turned into the face. Each flange is also turned on the back, slightly tapering so as to be thinnest at the outer edge. The rings so prepared may be put face to face, with caoutchouc or other soft packing material or cement between them, or with rings of copper or other comparatively soft metal laid into the V grooves. The faces are then pressed together by means of a ring of steel or iron, with an internal groove turned or rolled therein so as to fit over the projecting flanges. This ring is put on in halves and closed by means of screw bolts or otherwise, and thus the two flanges are drawn tightly together, and are held permanently in that position. Any number of rings may be thus joined together so as to form a continuous cylinder, the ends of which may be closed by strong flat or dished end plates, joined to the cylindrical portion by clip rings as described. The rings may be rolled conical, so as to produce a vessel of tapering form, and the flanges may project inwards and be clipped by internal rings divided into two or more parts forced outwards by wedges or screws.

In constructing hydraulic accumulators in this manner the end ring is rolled into such a form as to admit of the introduction of a cup leather or other packing. The plunger may be constructed, as above described, of rings of internal flanges and turned on the outside to give a smooth working surface. In constructing hollow cylindrical vessels intended to resist blows, such, for example, as cylinders for the protection of riflemen in the field or for protecting cannon, he prepares rings composed of two descriptions of metal, the one being possessed of great toughness, and the other of hardness. For this purpose he casts or forges a ring of mild metal, which may be steel or iron, and placing the same in a circular mould while in a heated condition, he pours into the mould cast-steel containing considerable percentage of carbon—say, from 1½ to 1 per

cent., according to the degree of hardness required. While the cast metal is setting and contracting, the inner ring is cooled by currents of air or sprays of water directed against its inner surface, so as to allow the outer metal to shrink without cracking, or for the same purpose the inner ring may be divided longitudinally. The two metals are thus intimately united or welded together, forming a composite ring which can be rolled out to the requisite thickness and diameter, with internal or external flanges or grooves for connecting several such rings together as already described. In producing in this manner thick rings for the construction of turrets for the protection of cannon the rolling may be dispensed with. For armour plates he adopts the same method of combining metals of different tempers by pouring the harder metal in the fluid condition upon the metal of milder temper.

Plates may be made to consist of several alternate layers of these different metals by placing in the mould into which the harder metal is poured several parallel plates of the more ductile metal. By directing a gas flame into the mould, these plates may be heated sufficiently to prevent cracking of the harder metal in setting, but the risk is also greatly diminished by dividing the plates by cross-cuts or deep incisions. Ingots or slabs are thus produced, which when hammered or rolled will be found to resist the penetrative action of projectiles in a remarkable degree. Their resisting power may be increased by hardening the surface of the finished plate by subjecting it while red-hot to the action of a spray of water. For producing shells or hollow shot of composite metal, he prepares a hollow core of iron or soft steel, and placing it in a heated condition in the mould, he pours over it the harder metal, taking care to cool the interior of the core while the outer metal is setting and contracting. The composite projectile thus produced is afterwards heated and forced by hammering or pressure into a metal die, so as to condense the material of its head and outer surface, which may be hardened by sudden cooling.

### WELL BORING APPARATUS.

An improved earth bore for boring wells and other like purposes has been invented by Mr. W. ROWLEY, of Rickmansworth, and consists in apparatus of simple and inexpensive construction, capable of being operated by hand power, and so constructed that the hole is bored and the debris formed by the boring chisel is brought up to the surface (when the tool is raised out of the hole) by one apparatus. It consists of a wrought-iron cylinder or tube divided by a partition at a convenient point in its length into two chambers, the upper one to contain the operating mechanism, and the lower one to receive the debris. To the lower end is attached a circular rim or shoe of rather larger diameter than the cylinder, in which is fixed the boring chisel or chisels. This end is furnished with an india-rubber valve, which allows the debris to rise past it into the lower chamber each time the tool falls, and retains it therein.

The boring chisel is fixed in bayonet slots by wedges or keys, which are themselves kept in place by a loose ring resting upon them, the ring also serving as a guide for the tube to slide up and down in. The apparatus is suspended by a rope, and is alternately raised and allowed to fall, a rotary motion being imparted to it at each stroke by the mechanism provided at the upper end of the tube for that purpose, and consisting of a swivel to which the rope is attached, the said swivel being fixed on a spindle, which turns with it and slides through a double clutch fixed in the tube. The corresponding half clutches are fixed on the spindle above and below the double clutch, and engage therewith, the teeth of the two clutches being so arranged relatively to each other that as the rope commences to lift the apparatus (the chisel being still in the ground, and prevented from turning), the teeth of the lower clutch slide on one another, so as to shift the upper clutch to the extent of half a tooth, and twist the rope.

The torsion of the rope causes a partial rotation of the whole apparatus as it is raised, so that the chisel will strike in a different direction at the next stroke when the teeth of the upper clutch slide upon one another, so as to shift the lower clutch to the extent of half a tooth, in order that the apparatus may be again partially rotated when again raised, and so on repeatedly. It will be obvious that the lower chamber of the apparatus may not only bring up the debris of boring, but also water, if the valve be made water-tight.

### LEAD ORES.

Date.	Mines.	Tons.	Price per ton.	Purchasers.
Feb. 15—	Central Foxdale	60	£13 16 0	Sheldon, Bush, and Co.
	—Great East Foxdale	20	11 0 0	Walker, Parker, and Co.
16—	South Darren	45	16 9 0	Nevill, Druce, and Co.
21—	Roman Gravels	180	11 15 0	Panther Lead Co.
	Rookhope	30	10 17 6	J. Dinning.
	Tankerville	50	12 0 0	Panther Lead Co.
	ditto	50	11 17 6	ditto
	West Tankerville	35	11 10 0	ditto
HORNACROS (Silver Lead).—This company sold on Feb. 13, to Messrs. Nevill, Druce, and Co., 29 tons 6 cwt. 3 qrs., for £918 9s. 3d.				

### BLACK TIN.

Date.	Mines.	Tons c. q. lb.	Price per ton.	Amount.	Purchasers.
Feb. 20—	Wheal Coates	3 1 13	£37 17 6	£116 4 3	Daubuz.

### COPPER ORES.

Date.	Mines.	Tons.	Price per ton.	Purchasers.
Feb. 22—	South Darren	20	£6 18 6	Nevill, Druce, and Co.

### COPPER ORES.

Sampled Feb. 6, and sold at the Royal Hotel, Truro, Feb. 21.

Mines.	Tons.	Price.	Mines.	Tons.	Price.
Devon Great Consols.	98	£1 17 0	Marke Valley	60	£2 15 0
ditto	92	1 14 6	ditto	62	3 11 6
ditto	90	1 12 0	ditto	30	1 6 0
ditto	87	5 4 6	Glasgow Caradon	82	3 16 6
ditto	83	1 12 6	ditto	72	3 17 6
ditto	82	1 14 6	ditto	56	2 19 6
ditto	74	1 9 6	ditto	39	2 10 0
ditto	73	4 16 0	Hington Down	79	2 8 0
ditto	72	1 14 6	ditto	25	2 2 0
ditto	44	1 11 6	ditto	25	3 3 0
ditto	39	4 4 6	Bedford United	62	3 7 0
South Caradon	86	2 12 6	ditto	58	3 9 6
ditto	85	4 4 6	Wheal Crebor	62	2 10 0
ditto	82	2 13 6	ditto	57	2 8 6
ditto	65	4 4 6	Gawton	42	2 7 6
ditto	62	7 0 0	ditto	46	1 12 0
ditto	51	10 17 6	West Maria & Fortescue	57	1 16 0
ditto	40	10 19 6	ditto	21	4 1 6
Marke Valley	79	2 9 6	East Caradon	70	3 11 6
ditto	65	2 16 6	Wheal Russell	45	1 16 0
ditto	63	3 10 6	Prince of Wales	22	0 13 0

### TOTAL PRODUCE.

Devon Great Con.	834	£2164 14 0	Wheal Crebor	119	£293 4 6
South Caradon	470	2535 5 0	Gawton	108	229 17 0
Marke Valley	340	968 17 0	West Maria, &c.	108	242 3 6
Glasgow Caradon	240	834 5 0	East Caradon	70	260 5 0
Hington Down	161	388 1 0	Wheal Russell	45	81 0 0
Bedford United	120	410 16 0	Prince of Wales	22	14 6 0

Average standard ..... £97 8 0 | Average produce ..... 6½  
Average price per ton ..... £37 17 6 | Quantity of ore ..... 2637 | Quantity of fine copper 160 tons 15 cwt.

Amount of money ..... £89 18 0 | Average produce ..... 8  
LAST SALE.—Average standard ..... £94 4 0—Produce, 6½

Standard of corresponding sale last month, £94 4 0—Produce, 6½

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Names.	Tons.	Amount.
Vivian and Sons	838	£2680 4 6
Nevill, Druce, and Co.	1693	5693 6 6
Williams, Foster, and Co.	848½	2662 0 3 0
Mason and Elkington	387½	1068 8 3
Total	2637	£2403 14 6

NO ORES on Thursday next, February 28.

Copper sale for sale at Tabb's Hotel, Redruth, on Thursday week—Mines and parcels.—Mellancar 549—West Tolgus 321—West Seton 221—East Pool 160—South Crofty 118—Carn Brea 50—North Bury 38—West Basset 27—Trevery's Regulus 27—Williams's Precipitate 1.—Total, 1503 tons.

THE SUPPLEMENTARY SHEET.—We have received occasional complaints, and to late a good many, that the Journal is delivered by country booksellers without the Supplement. Subscribers would oblige us by demanding that the paper should be handed to them complete, as every Journal is accompanied by the Supplement when it leaves our office, and the fault of omission must rest with the country bookseller or their London agent.







Improved, now worth for the width of the level (5 ft.) 30 cwt. of ore per fathom; the level at the extreme end of level is presenting a strong and masterly appearance, and promises a further improvement. In Curtis's cross-cut, middle level, south in the 73 east, the level appears to be of an immense width; the part we are cross-cutting through is much the same in character as for some time past, composed of kilas with branches of carbonate of lime and spar crossing the driving spatted with ore. The 52 end, west of Lloyd's cross-cut, is in a very nice lode, which is composed of kilas and spar, intermixed with ore, equal in value to my last report, worth fully 20 cwt. of ore per fathom; in ground rather stiff, which renders progress slow. In the 52 end, east of shaft, a branch carrying kilas came in from the south side of the level, and obliquely crossed the driving, which has heaved the lode more to the north, and the lode at present is in a disordered state, now worth 1 ton of ore per fathom; there is a strong feed of water issuing from the forebreast, and from other indications it is my opinion that as soon as the level is extended beyond the influence of said joint the lode will again improve. I have withdrawn the men from the stope over the 40, east of shaft, and have put them with two others to sink a winze in the bottom of the 40 with a view to ventilate the level below (the 52), and also to lay open the ore ground which has already been driven through in sections for stopping; the said winze is going down in a strong ore lode. During last week our crusher was idle four days, undergoing repairs, but I am pleased to say it is now in thorough order, and is working well; in consequence of this delay our sampling is not in such a forward state as I could wish, however every effort shall be made to pull up the lost time. The machinery is in good working order.

**NEW SOUTH MERLLYN.**—R. Rowlands, Feb. 21: The north level is looking very promising; we are getting splendid blocks of lead out of the 80 level south. **NORTH LAXEY.**—John Sowden, Feb. 19: In the 146 end south we have cut through the lode in the hanging wall, which is 2 ft. wide, composed of spar, with a slight improvement for lead and blende. The north end continues hard, but the lode is getting stronger again, now 1 ft. wide, and not without a small quantity of lead. There is not any change in the 84 end. We have not intersected anything in the 73 cross-cut yet. The 60 stope is worth about 1 ton of lead per fathom.

**PANDORA.**—H. Nottingham, Feb. 20: New Lode: The 33, driving south of Pyne's shaft, has improved since my last. The lode is now from 2 to 3 ft. wide, ore throughout, but the ground is yet very hard and close. Further improvement may be expected here as the end advances. No. 1 stope, over the 23 south, is without change, worth 10 cwt. lead and 15 cwt. blende per fathom. No. 2 is worth 1 ton of lead and 1 1/2 ton of blende per cubic fathom. The end in the 13 is now in the black shale, which makes between Nos. 1 and 2 runs of ore, and I expect to meet the No. 2, a few fathoms further driving. Goddard's Lode: The end in the 31, going south from shaft, and east, is still hard, wet, and consequently slow of progress, but yielding good lead and blende, worth 1 1/2 ton of each per fathom. The same level now going north of cross-cut looks fully better than the south end. Here the lode is more rughe, with a good deal of pink and white spar, the first of the kind I have seen in the mine. The end in the 23, going south, presents a better appearance than for some time past, and is yielding more blende, with a little lead. The same level going north from shaft cross-cut is still unproductive, but there are indications of an approach to mineral ground. The mid level above this is suspended, and the men placed to stope the roof, which is worth 10 cwt. of ore, and about 15 of blende per fathom. In driving the 13 we find the lode very small and unproductive, but expect something better when we reach the No. 2 east and west lode, which must be a little in advance of this end. The stope above this level is, as for some time past, worth 10 cwt. of lead and the same of blende per fathom. At surface the weather is very fine and open, which is favourable for dressing purposes, and we are doing our utmost to make the best use of it. Since writing the above report I have again been underground, and am happy to say the 33 south, on new lode, is improving every inch we drive. The lode is now near 3 ft. wide, ore throughout. The 83 south, on Goddard's lode, is also beginning to open and let out more water. We have also lead coming in the 23 north, on Goddard's lode, which is encouraging. —H.M.

**PARYS MOUNTAIN.**—T. Mitchell, Feb. 21: Everything is going on in the usual regular way here. It will be our setting day on Saturday next, when the setting report shall be forwarded you.

**PAPELEY BRIDGE.**—C. Williams, Feb. 21: The Rake vein in the 30 east is 6 ft. wide, and worth 2 tons of lead ore per fathom—ground favourable. The same vein in the 30 west keeps improving as we approach the run of ore ground gone down in the sole of the 20, being 6 ft. wide, and worth 15 cwt. of lead ore per fathom—ground stiff and spare for progress. The vein in the stope in the back over the 30 east is 4 ft. wide, and worth 1 ton of lead ore per fathom. The vein in the stope over the back of the 30 east, 20 fathoms east of engine shaft, is 3 ft. wide, and worth 1 1/4 ton of lead ore per fathom—ground hard. The tribute pitches (four in number) are without any change; they are producing lead ore in paying quantities. The smelting department is progressing very well.

**PEDN-AN-DREA CONSOLIDATED.**—Wm. Tregay, Feb. 21: The lode in the 140 west end is worth 20 cwt. per fathom. All other places as last reported. **PENNANT.**—Feb. 21: The engine-shaft is, I am glad to say, down 32 yards under the 80 yard level; the same favourable indications continue. The 51 west lode is favourable; there is more lead in the carbonate at the stope in the 60 east. We are making very fair progress throughout the mine, and the machinery is in good order.

**PLYNLIMMON.**—J. Garland, Feb. 21: In the 35, east of Jones's winze, the lode is pinched up by a change in the dip of the sandstone, and does not contain any lead ore to value. In the same level, west of Herbert's winze, the lode is large and open, producing occasional stones of lead ore only; considering the hard nature of the ground, fair progress is being made in these two ends. In the 35, east of Herbert's winze, the lode has fallen off in value during the past few days; the main lode produces lead ore to the value of 1 ton per fathom; in addition to this there are several small branches to the north and south, which are of no value; these branches will probably shortly unite with the main part, when an improvement may be expected; this was the case in level above. I may also add that as this level advances eastward it will get away from the influence of the sandstone. The 24, east of new winze, has entered the eastern band of unproductive shale; the lode is small, and of no value; this end will be suspended forthwith. The driving of this end has proved that we may expect a further lengthening of the ore ground in the level below to the extent of 6 to 8 fms. The stope over the 24, east of new winze, is without any change for the length of the ore ground. The weather continues very mild and open, and dressing and crushing are being kept on with regularity. We hope to sample another 20 tons of lead ore on Tuesday next. The machinery throughout the mine is in fair working order, with a good supply of water.

**PRINCE OF WALES.**—John Andrews, Feb. 20: The lode in the deep adit end, west of Vigar's shaft, is 1 ft. wide, composed principally of quartz and capel. The lode in the shallow adit end west is 15 in. wide, but at present poor.

**ROMAN GRAVELS.**—Arthur Waters, Feb. 21: The men who have been driving the 108, north of flat-road shaft, are now driving the cross-cut east of Roman lode towards east lode. The 108, south of shaft, is into a point where the Roman lode is split, neither of the parts containing much of mineral; the 95, north of this shaft, is yielding stones of ore. The stope above this level, north and south of Dorriott's winze, are yielding their usual quantities of ore. The new engine-shaft is going down below the 95 with fair speed; the ground is hard, but of a congenial character. The lode in the 95, south of the said shaft, is 5 ft. wide, now quite perpendicular, and worth 1 ton of lead ore per fathom; we bored twelve holes in this end yesterday and ten holes along this morning shift with the machine drill, and I am of opinion that when the men get fully accustomed to the work fifteen or twenty holes can be bored per shift. The 80, south of new shaft, is worth 3 tons per fathom; the stope in this level is yielding ore in profitable quantities. The 65, south of the above shaft, is worth 4 1/2 to 5 tons of lead ore per fathom, the lode being 12 ft. wide, and quite perpendicular. The new 60-in. pumping-engine continues to work splendidly. Our sale of 180 tons lead ore to-day (the produce of 4 or 5 weeks) realised 215s.

**SOUTH DARREN.**—H. James, A. Gundry, Feb. 21: The sinking of the shaft is progressing favourably, with the same good indication for lead as last reported. No change to notice in the 100 end east. The western end in this level has improved, now forming a strong lode, with a good mixture of lead and carbonate of lime, value 8 cwt. per fathom; the lode is improving in hardness as it advances. The winze in the 90 still holds good; the lode is strong and massive, and worth 6 ton 2 1/2 to 3 tons of lead ore per fathom. The stope in this level continues to look well, and worth in the aggregate 25s. per fathom. In the 80 forebreast the lode has greatly improved in size and value, and now fully 3 ft. wide, and worth for lead ore 25s. per fathom. The stope in this level realised the same in value as last reported. Samples of 20 tons of copper ore were sent off on the 15th inst. for sale on the 22nd. The cog-wheel driving the big crushing mill broke last night, which will cause a little delay in the dressing. A new one is ordered, and will be fixed as soon as possible.

**SOUTH MOLTON CONSOLS.**—J. Harris, Z. James, Feb. 21: We have cleared out the 22, north of cross cut about 7 fms., up to an old adit. At about 4 fms. north of cross cut the lode is disordered, and the old workers have proved the ground in this direction fairly, and we have put the men to rise at about 4 fms. north of the cross cut, to see if we can hit the shoot of lead dipping north from the 12. The lode is about 18 in. wide, spangled with lead, but not to value. The lode in the stope below the 12 is about 15 in. wide, and worth from 2 to 3 tons of lead ore per fathom. The lode in the 12 south is looking more promising than for some time past. The lode varies in width from 1 ft. to 2 ft., being well defined; it being made up of soft kilas and quartz, and we think we have a fine prospect before us going south.

**ST. PATRICK.**—Wm. Francis, Feb. 20: The appearances in the 120 yard level cross-cut north continue of the most favourable kind; the matrix of the cross-course being of the best lead-bearing kind, as appertaining to the vicinity of an east and west lode. Nothing could look more encouraging. The lead ore now found in it seems more diverted towards the heading side, which is itself a firm wall, whilst the cross-course is wider than the width of the level, so that a portion only is worked. Since writing my last report the 60 yard cross cut in the chert has been rather tighter, and of a darker colour, but I am glad to say it has resumed its usual characteristics.

**TANKERVILLE.**—A. Waters, Feb. 21: In the 192, west of Watson's shaft, the lode is of considerable width, composed of carbonate of lime and lead ore, worth 3 tons per fathom. This end is now about 13 fms. from shaft. The 192, east of Hooton's winze, east of shaft, is worth 2 tons per fathom. The five stopes in back of the said level, east and west of shaft, are worth, on the average, 2 1/2 tons per fathom. The 152, west of shaft, is worth 1 ton per fathom. Stope in the back of this level worth 2 tons per fathom. The winze in the 152, south of shaft, is 167 west is worth 1 ton per fathom. In the 152 cross-cut north we have just cut into the wall of one of the north lodes. Shall see what this lode is like by the next report day. The other points and pitches in the mine are without change since last fully reported on. We have to-day sold 100 tons of lead ore, realising 1193s. 15s.

**TEESDALE.**—Thomas Watson, Feb. 15: New Vein in Hopkins' Level: We have now driven 2 fms. in the vein west from the rise; we have no further improvement in the value of the vein; it produces some good samples of lead ore, but not sufficient to value. We have 12 ft. of blende with the boulder clay lying on the top of it. Nothing has been done at the ore dressing this week.

**TEMPLE.**—Feb. 20: In the No. 3 level a decided alteration of a very promising nature has occurred during the past week. The bands of spar alluded to in a former report are now nearer together, and contain good prills of lead. No doubt when these bands come together a deposit of lead, or a continuation of that deposit of lead now in the No. 2 level end will be met with in No. 1 end; also an improvement is noticed since last week, there being more blende visible. This level, however, has some few fathoms further to be extended before it comes under the deposit of blende in No. 2. The inspecting engineer who visited the mine last week reports: "You cannot possibly improve on your present method of testing the lode. The work you have already done shows that the lode is of a most promising character, and even at the shallow depth attained produces lead in paying quantities. My opinion is that you should continue your present levels 15 fms.

or 20 fms. further into the hill, and communicate the levels by winzes, and if the lode continues to improve as hitherto, which is very likely, you would have a good range of ground to stope sufficient to keep dressing machinery at work during the time other sections were being laid open."

**TOLGUS CONSOLS.**—W. C. Vivian, Feb. 21: There is nothing new to-day which I think worthy of note in the 40 cross-cut north, nor in the same level west of cross-cut on the south lode. Fair progress is being made in both ends.

**TELEIGH WOOD.**—W. Goldsworthy, Feb. 21: There is no change to notice in the mine this week. Everything is being pushed on as fast as we can. The machinery is still in good working order.

**TIN-Y-FRON.**—E. Jones, Feb. 19: We are continuing the cross-cut south of the eastern level, in which the ground keeps just the same as I mentioned last week, but we find more of the oxide of iron in the joints, and nearly all through the ground, and a strong stream of water is coming from the end, which is a good sign for a rich lode before us. We are now in 7 fathoms from the adit east, on north lode.

**VALE OF CONWAY.**—John Roberts: No. 2 Adit: We have been for some time leaving the lode to stand, so as to prevent so much of the country rock mixing with the lode. The last time we took down the lode we had fine rocks of lead. In about three or four months more I hope that we shall intersect the Rabbit lode with this level, and if this latter lode continues down, of which there is no reason to doubt, we shall soon open good lead ground on this also. The stope in the roof of this level, on the whole, are looking very well. The end at this point had passed through a poor neck, and, as may be expected, the stope are not so good close on the back of the level. No. 3 Level: The ground here is very favourable for driving, and the lode is improving as it gets away from the influence of the cross-course, now about 1 ft. wide—a strong mixture of lead and blende, making good saving work. We shall complete another parcel of lead next month in good working order.

**WEST GOLDFIELD.**—John Pope, Feb. 20: Wilson's lode at the 70 continues to open out very satisfactorily. The other places in operation are producing their usual quantity of tin and copper ores. Full report will be forwarded in time for the general meeting on Tuesday next.

**WEST ROSEKAR.**—H. Stephens, W. Bennetts, Feb. 21: The 12 fm. level, driving west on the caunter lode, is saving work for copper and blende, a very promising lode, with an increase of water, which leads us to think that there is a better lode before us. There is no other change to notice in our underground operations. The masons are making rapid progress with the building of the engine-house, and all other surface operations are going on satisfactorily.

**WEST TANKERVILLE.**—A. Waters, Feb. 21: The 85, south of winze south of shaft, is going forward in a kindly lode worth 3/4 ton per fathom. The stope in this level, north of the winze, is worth 3/4 ton per fathom. The stope south of winze is worth 1 ton per fathom. The lode in the 75 south is at present small, and not to value. The four stopes in the back of this level south are worth 3/4 of a ton per fathom each. The stope in the back of the 63 south is worth 1 ton per fathom. We have to-day sold 35 tons lead ore for 402s. 10s.

**WEST WHEAL TOLGUS.**—Feb. 20: Taylor's Shaft: The ground continues hard, the men are at work in the bottom of the shaft, but progress is slow. The rise in the back of the 145 has been held to No. 1 winze since our report last week, and we have resumed driving the end (the 145) from the rise. The lode in the end is 4 ft. wide, yielding 5 tons of ore per fathom. The lode in No. 2 winze under the 135, west of shaft, is 8 ft. wide; there is more spar in it than when we wrote last, but we think it is only a patch, and will soon be gone; it is a strong fine lode now, and it will yield 9 or 10 tons of ore per fathom. The lode in the 135 end west is smaller than it was, and will only yield about 1 ton of ore per fathom. The lode in the side of the level, between No. 5 winze and the end, is yielding quite as much as we put on it, making the full value of the lode 11 tons of ore per fathom. The lode in the 125 end west is 18 in. wide, yielding 1 ton of ore per fathom—a kindly lode, and good ground about it. Richards' shaftmen are sending up the old lifts and putting the shaft in repair. The ends at this shaft are still poor, lode small in both ends. No alteration in the stopes to remark on. We sampled the quantity of ore yesterday which was promised in our report last week—321 tons.

**WHEAL CREBOK.**—John Andrews, Feb. 19: The lode in the 120 east is 4 ft. wide, worth 10 cwt. per fathom. The lode in No. 1 stope in the back of the 120 is worth 12 cwt. per fathom. The lode in No. 2 stope in the back of the same level is worth 13 cwt. per fathom. The lode in the 108 is looking a little more promising, and is now yielding some good quality arsenical muddle, but is still poor for copper. There is no change in the 72 or 43 ends. The sinking of the new shaft is progressing favourably.

**WHEAL GRENVILLE.**—T. Hodge, Feb. 20: We commenced the building for our 80 in. engine on April 20 last, at which time we calculated it would take us about 12 months to erect the same and get the shaft down for a 150 fm. level; at that time the shaft was only to the 140. Since April last the following work has been done:—90 fms. of wire-rope, with pulleys, bobs, &c., fixed in the 110 to drain and wash shaft. The lode in the 110 has been cut down and made secure 140 fms. and sunk 10 fms. for a 150 fm. level, and driven west at the level 10 fms. towards the western shaft; fixed 150 fms. of 16-in. pitwork with bobs, &c., complete. Buildings: An engine house, boiler-house, and stack for the new 80-inch engine, a house for the steam capstan, and new leading inside and out at the stamping-engine. The old stamping-engine has been taken out, and a new 30 in. erected. A new 8-in. cylinder double-acting engine has been erected to drive steam capstan, the latter with loadings, &c., complete. Gould's 80-in. engine has been erected with three boilers, and I am pleased to say that we started the engine to work on Friday last, when everything went off satisfactorily. The engine and pitwork are working to our entire satisfaction. I regret to say in consequence of the water being in at the 150 at the western shaft, for over two months that we have not been able to communicate the level with Gould's shaft; but for this our engine might have been got to work sooner; however, considering the whole, I think we have done a large amount of work in the time, and with all our hindrances with the water we have been able to keep our returns pretty regular. We shall sell to-morrow over 13 tons of tin.—Gould's Engine Shaft: The water is now being drained to the 140, and it will take us another week to get fairly to work at the 150. There is no change in this part of the mine since my last. Nothing has been done in the bargains during the last fortnight. Western Shaft: The water is about 4 ft. below the 150; our forking here is very slow indeed; the 160 has not been drained for five months. The 150 east end is worth 8 cwt. per fathom. The stope in the back of this level is worth 8 cwt. per fathom. No. 2 stope in the back of this level, is worth 8 cwt. per fathom. Rodda's stope above this level is worth 6 cwt. per fathom. The 140 fathom level east end is producing stamping work. The 130 west end is worth 8 cwt. per fathom; a kindly lode. No other change in the bargains. The pitches generally are producing fair quantities.

**WHEAL KILLEY (St. Agnes).**—S. Davey, R. Harris, Feb. 16: We have no change of importance to communicate this week. The various points of operation maintain their value, as sent you last week.

**WHEAL MARY HUTCHINGS.**—H. Miners, Feb. 2: We shall complete the laying down of the new tramway to-morrow, and intend lighting the kilns and furnaces on Friday, when I hope in my next to give a much better result of our returns.

**WHEAL NEWTON.**—H. Bennett, Feb. 21: We have to-day commenced to sink the engine-shaft below the 44, and hope in a few days to be working with the engine to work on Friday last, when everything went off satisfactorily. The engine and pitwork are working to our entire satisfaction. I regret to say in consequence of the water being in at the 150 at the western shaft, for over two months that we have not been able to communicate the level with Gould's shaft; but for this our engine might have been got to work sooner; however, considering the whole, I think we have done a large amount of work in the time, and with all our hindrances with the water we have been able to keep our returns pretty regular. We shall sell to-morrow over 13 tons of tin.—Gould's Engine Shaft: The water is now being drained to the 140, and it will take us another week to get fairly to work at the 150. There is no change in this part of the mine since my last. Nothing has been done in the bargains during the last fortnight. Western Shaft: The water is about 4 ft. below the 150; our forking here is very slow indeed; the 160 has not been drained for five months. The 150 east end is worth 8 cwt. per fathom. The stope in the back of this level is worth 8 cwt. per fathom. No. 2 stope in the back of this level, is worth 8 cwt. per fathom. Rodda's stope above this level is worth 6 cwt. per fathom. The 140 fathom level east end is producing stamping work. The 130 west end is worth 8 cwt. per fathom; a kindly lode. No other change in the bargains. The pitches generally are producing fair quantities.

**WHEAL PEEVOR.**—W. T. White, Joseph Pryor, Feb. 16: Setting Report: The 80 to drive west, on south lode, by six men, for the month, at 6s. per fathom, lode worth 12 cwt. per fathom. We now have good ventilation for driving this end, having communicated the rise with the 70 winze; this has also laid open a fine piece of coping rock, which is in reserve. The 70 to drive west, on north lode, by four men, for the month, at 5s. per fathom, lode worth 12 cwt. per fathom; this is the cross-course, we have had a good lode home to the cross-course, and we fully expect the same to the west of it, as is the case in the levels above. Two stopes in back of this level, by eight men, for the month, at 2s. 10s. per fathom, lode in each worth 12 cwt. per fathom. Rise in back of the 70, on south lode, by four men, for the month, at 5s. 10s. per fathom, lode worth 12 cwt. per fathom; this is opening up good ground. The 60 to drive west, on south lode, by four men, 6 ft. certain, at 9s. lode worth 14 cwt. per fathom. Four stopes in back of this level, by 16 men, for the month, at 5s. and 6s. per fathom, lode in each worth 9 cwt. per fathom. Rise in back of the 60, on south lode, by four men, at 5s. per fathom, lode worth 10 cwt. per fathom; this rise is directly to the west of the cross-course for ventilating the 60 and 45 ends, &c. The 45 to drive west, on south lode, by four men, for the month, at 5s. per fathom, lode worth 20 cwt. per fathom. During the past month we have cut the cross-course in this end, and the above is the value of the lode to the west of it. Rise in back of this level, by four men, at 11s. per fathom (for 12 ft. long), lode worth 15 cwt. per fathom; we are expecting daily to communicate this rise with the 36 cross cut. A cross cut to drive south at the 38, by six men, at 6s. 10s. per fm.; this is the cross cut referred to in connection with the above rise. We have cut the south lode in the deep adit cross-cut, and as far as seen it is very productive; as we can now see this lode for about 80 fms. in height. We also set 13 pitches on tribute to 36 men and boys, at tributes varying from 8s. to 12s. in 17. The mine is still opening up very well, and returning between 30 and 40 tons of tin per month. The masons are making fair progress in erecting the new calciner, and we hope soon to get it completed.

**WHEAL PRUSSIA.**—Wm. Tregay, Feb. 21: Tregay's shaft is being sunk by six men; lode producing 1 ton of black tin per fathom. The water is quick here, but the engine keeps it with perfect ease. The 40 west will produce 2 tons of black tin per fathom, both in the end and in the stope below. The deep adit west end will produce 12 cwt. of black tin per fathom.

## FOREIGN MINES.

**DON PEDRO.**—Telegram, dated Rio, Feb. 15: Produce for January, 5000 oits. **RICHMOND CONSOLIDATED.**—Telegram from the mine at Eureka, Nevada: Week's run, 800,000, from 1100 tons of ore; week's produce of refinery, 840,000.

—H. Rickard, Jan. 30: During the past week mining operations have been carried on without interruption. The 200 drift is still being changed; the produce above this level is turning out its usual quantity of good ore, and shows no signs of diminution. The 400 main drift is in limestone without any ore. The stope above this level is looking about the same. The new stope above this level started from the rise connecting the 200. The 400 is opening out well, and the height of ore now seen is 21 ft., with ore still in the back. The 500 cross cut is still in hard limestone, with occasional seams of stained lime and iron matter. The 600 on the quartzite will be suspended for a time, so as to make communication from the shaft direct to the drift for ventilation. The facility of working. The 800 on fissure is without change. The winze below the 900 is still being sunk with fair progress, and the water has not increased since last week. We have started a drift in the 900 on the quartzite drifting towards the line to explore the ground in that direction. Everything in the smelting department is going on smoothly.

**LONDON AND CALIFORNIA.**—The clean-up at the Original Amador Mine for the month of January is estimated at \$8000.

**SIERRA BUTTES (Gold).**—Result of the working at the Plumas Eureka Mine for January:—Total receipts, \$39,758; Total California expenses, including cost of mining, milling, erection of new buildings, &c., \$16,799. The mills at the Sierra Buttes Mine were started on the 1st inst., and the supply of water was getting plentiful, and the prospects were good for more.

**BLUE TENT.**—D. H. Hughes, Jan. 26: Considerable rain fell during the past week, but much of it was snow above at the head of the ditch, consequently we have had no water in our own ditch, but we are washing at the South Yuba Canal

since the last storm with water furnished us from the South Yuba Canal Company and our prospects are favourable now for having a regular supply of water from them right along from this, enough to run the South Yuba and Blue Lead a portion of the time probably. Another storm is at hand, I think, which I hope will give us enough water to run the whole diggings.

**BIRDSEYE CREEK.**—G. S. Powers, Jan. 27: My last was dated the 17th, at that time we had nearly a ditch full of water, but the weather turning cold the water diminished to about 500 in., and the head has been varying since up to this morning, when it started to rain in earnest, and at this hour, 9 P.M., it is just pouring. We have the damage repaired at Red Dog caused by the wind storm of the 16th, and shall turn the water through the pipes on that claim to-morrow morning. Everything is in as good condition as could well be, and I think there will be sufficient water to keep the ditches well filled for the next three or four months at least. I shall commence to raise shaft at Walopna about Feb. 1 if the rock is favourable at that time; we are now in a hard vein of rock, but I feel in hopes that it will not continue.

**HULTAFALL.**—H. Bankart, Feb. 15: The present depth of shaft from surface is 107 ft. The first level on the lode dipping north entered at the 90 ft. level 20 ft. high, have gone in 30 ft. in nearly solid mineral, leaving the lode on the face, and have turned off to the south-west towards the Perkins' trail; this is in 17 ft.; for the first 12 ft. I drove through barren ground, then came upon the main body, and am in ore throughout the face, leaving mineral on both sides; at the present moment there is about half lead and half blende—4 1/2 tons lead and 3 tons blende. During the last fortnight I have neither done any sinking or driving, having been engaged in timbering down to the 90 ft. level, and dividing each compartment into two divisions, two to draw from the level, and two from the shaft independently of each other; this work will be completed this week, when mining operations will be immediately resumed. In the shaft the lode has for the moment been thrust out to the south side towards the lake by a horse, but depth will again bring me into it. The mineral is beginning to go down to Salolm, but the snow has again to a great extent departed.

**PROVIDENCIA AND NEW ROSARIO.**—Extracts from Mr. Cumins' letter, dated January 14.—The extraction of ore for the fortnight amounts to about 16 tons, worth about 8s. per ton. Diminution owing to the increased hardness of the lodes in San Juan and San Miguel, and also to the poverty of the bottom and north end of the former working, which has been holed to San Guillermo. The ore is still holding in the south part of San Juan, and although the lode is very hard the quality of the ore is better, as the dressing of the last two days has said 13 mos. 75 cts., which was much above my estimate of its value. As San Juan has been holed to San Guillermo, and as only the south part can be worked profitably it is probable that the total extraction of ore will be somewhat less during a few weeks unless the lodes in San Miguel winze and level become easier. Immediately where the east and west lodes cross the winze lode is very poor for a length of about 33 inches, and makes ore further north and south. The winze lode descends almost vertically, with a scarcely perceptible incline west. As I believe, however, that it is part of the same lode as that in the shaft it will no doubt prove to be a western underlayer, and the only western underlayer that we have, I think, that may make ore. If it is as I suppose a part of the same lode as that over which the shaft has been sunk it must be from 4 to 5 yards wide. It is not at all improbable that something which we are unable to detect is causing the lode to descend so vertically, and at the depth of 9 or 10 fms. may increase its underlie, as it did in the shaft, and become more productive. For that reason I am anxious to force the sinking of the winze.

San Miguel north level has been driven 1 vira 80 cts. during the fortnight, with extremely hard ground for boring. According to the position of Polina shaft the level of the level is about 33 in. short of being under the centre of the shaft; considering the short distance driving the improvement is very remarkable, and will probably be better after a short time, as the pinta is better. Mr. Ivey assayed a selected stone from each side; that from the eastern side assayed 16 mos. 30 cts. (about 16s. per ton), that from the western only 10 mos. (10s. per ton). The present average of the ore is from 8 to 9 mos. (8s. 10s. to 9s. per ton).—Hacienda: Mr. Ivey has washed off his second torta, and run down three bars of silver weighing 311 mos. (worth about 497s.), which have been sent to Mexico. Three bars being incorporated, and another being brought forward.

**LAPE COPPER.**—The Oropisa, Spedakel, and other reports are received. Return for December, 970 tons; the assay cannot be reported, as the document which shows the return in detail has not arrived by present post. Bills of lading received—27 tons per Warwick Castle; 65 tons per Edinburgh Castle; 68 tons per Balmoral Castle; and 500 tons per Mary Bowen.—Arrivals at Swansea: The Caradoc, Dillwyn, and Ogmose.—Sales of ore: By public tender on Jan. 30, 480 tons, at an average of 13s. 2d. per unit; and on Feb. 13, 520 tons, at an average of 13s. per unit.

## ECHOES FROM THE MINING MARKET.

The mining market is still without material change. Business remains, therefore, in a very quiet condition. We are able to note, however, slight advances in both tin and lead. Not that these improvements have amounted to much, but the alterations, however slight, being for the better may portend more substantial advances by-and-by. The more favourite lead shares continue to attract the chief attention of investors whilst tin shares are neglected. Of lead shares the transactions of the past two or three weeks have been in Van, Roman Gravel, D'Essey Mountain, Tankerville, North Laxey, Rookhope, Leadhills, Great Laxey, and West Chilverton.

In copper shares Devon Great Consols have been firm at 3 to 3 1/2, and Parys Mountain at 9s. to 11s. The Belstone Company is to be re-constructed as the Mid-Devon Copper Mining Company.

Colliery shares have been chiefly represented by Chapel House, which after advancing to 3, buyers have receded to 2 1/2. A few transactions have taken place in Alford, which is now at 1 1/2 (1s. share), in New Sharlston Preference, in Newport Abercorn, and in Cardiff and Swansea, bearing a preference circular from the Great Western Colliery Company, announcing that it is proposed to reconstruct on the following basis:—A new company to be formed with a nominal capital of 150,000l., in shares of 5s. each, divided into 14,000 ten per cent. preference, or 16,000 ordinary shares. The new company to take over the whole of the property and assets of the old company, subject to all its liabilities excepting debentures and arrears of dividend on the 7 per cent. preference shares, in respect of which latter item all claims are to be waived. The 10 per cent. debentures of the old company (both classes) amounting to 66,554l., to be exchanged for an equivalent amount in fully paid-up shares of the new company, bearing a preferential cumulative dividend of 10 per cent. The holders of the 7 per cent. debentures (these amount to only 1500l.) to receive 14 of the 10 per cent. preference shares for every 100l. debenture. The arrears of debenture interest up to the date of the proposed arrangement for reconstruction taking effect are to be considered as arrears of dividend due upon the 10 per cent. preference shares of the company. The shareholders are to receive in respect of each 7 per cent. preference share held by them in the old company either two ordinary 5s. shares in the new company (paid up with 3s. 15s. paid, and in respect of each fully-paid ordinary share held by them in the old company either one ordinary fully-paid 5s. share in the new company or two ordinary 5s. shares with 3s. 15s. paid. The details are somewhat complicated, but for the ordinary shareholders it will be seen that they have the option of receiving one fully-paid share in the new company in exchange for one of the old company, or two with only 3s. 15s. paid up. The latter alternative, whilst giving them two shares instead of one, carries with it a net liability of 2s. 10s.

We understand that at the next meeting of the Peavor adventurers a dividend (paid up) of 3s. 15s. will be declared. Peavor has been doing uncommonly well (paid up) of late, so well indeed that the dividend will be only 50 per cent. in value, which could be paid. From 35 to 40 tons are now being raised monthly, bearing a preference where about 31l. per ton. The most important fact in connection with the mine is that on the south lode it has now been proved for 8 fms. in depth, and at every point the lode has been found productive. On Tuesday last it was cut in the deep adit cross cut, and although not large it is a good lode, and on assay shows a yield of over 1 cwt. of tin to the ton of stuff. The last setting-report is a very good one, for the mine is looking at its best. Mellanear continues to do well, and a fair business is being done in the stone, which has risen to 3 1/2, 3 3/4.

Since the North Laxey meeting the share has been very flat. So far the mine has been a great disappointment to the shareholders, the present set alone having sunk some thousands of pounds in it. The company will now wind-up, with the view of reconstruction. Of course bonus shares are to be offered to the old shareholders (and others) as an inducement to come forward with the "sinews of war." We think this system of giving bonus shares in case of liquidation a bad one, and, if we remember aright, have expressed such an opinion before in these columns. In nine cases out of ten it amounts to a useless loss of capital, whilst the least of such shares (in virtue of holdings in the liquidating company) to disheartened shareholders many of whom are simply plain men, bearing a price for sale at whatever they will realise, heavily depreciates the value of all the shares held in some cases annihilates it altogether. We are aware that supporters of the liquidating-bonus system say—"We must hold out some inducement in these times." In reply we would turn to the investor, and ask him whether he thinks because he receives a certificate stating that (say) 2l. has been paid up, when he knows only 12. has been actually contributed (for that is the net result, even though he pays 2l. for one share and receives another free), the market will value his share at 20s. The advent of other shares in the market, the market value of the shares already indicated, in fact, generally reduces the money value below cost price. Of course exceptions occur, but as a system we think the issue of liquidating-bonus shares is to be condemned.



The Market for Mine Shares on the Stock Exchange has during the past week been, if possible, less animated than before; there has consequently been no material variation in prices, which remain, as for some time past, almost entirely nominal. The property of the Lossiemouth Lead Mining Company, near Elgin, Scotland, has been inspected, and favourably reported upon, by Captain M. Grose, Mr. William Frost, Mr. T. Currie Gregory, and Mr. Leslie C. Hill. They concur in the opinion that it promises to prove a success if properly worked. The Boscundle Mining Company accounts from July 30 to December 29 showed a credit balance of 603*l.* 2*s.* 4*d.* A call of 5*s.* per share was made. This being the first general meeting the proceedings were chiefly formal, but Mr. R. H. Williams, A.I.C.E., reported that "the mine is now in a full state of developing, and can be cheaply opened out, and a moderate



state of richness will enable us to work at a profit." At Holmshush a petition for winding up this concern was presented to the Chancery Division of the High Court of Justice on February 7 by Mr. James Shoolbred, of Nicholas-lane, Lombard-street, bill-discounter, a creditor of the company, but it is stated that it has since been withdrawn.

The Mining Stock Exchange of New York has not accomplished much as yet, and if the annexed paragraph from a local journal be true, the sphere of the Exchange is liable to further contraction:—

There is considerable gossip regarding the probable establishment of a branch in New York of the Bank of Nevada, with a capital of \$20,000,000. The object is said to be to loan money upon mining stocks, the transfer books of which shall be kept with the bank. It is to be hoped that the scheme will carry through, for it is a most pitiable sight to witness the efforts of the members of the Mining Exchange to keep bodies and souls together. The majority of the so-called "operators" find it difficult to pay for fare up and down, and their offices are in their hats. Not long ago one of the prominent officers of the concern cleared out with his customers' money, and there is no doubt that the operation would be repeated if many of them had funds to get away with. The establishment of a branch of the Bank of Nevada would be a God-send to this suffering community.

However unremunerative the working of American mines may have proved to English capitalists, the results constantly published go far to show that the fault is rather with the directors and managers than with the mines themselves. The evils of "guinea-pig directors" have been complained of ever since the limited liability system has been in force, but of late the incompetence of directors of this class has been aggravated by their appointing to offices of secretary, manager, mine agent, superintendent, and so on, of relatives and friends totally unacquainted with the duties of the offices for which they are selected, and even more wanting in common sense and integrity than those by whom they are appointed. Mr. Henry Sewell forwards us some particulars showing that the so-called "outside bonanzas" have been more productive and more profitable than the average Comstock mines, although these have always been so popular with investors. The Northern Belle has never made a call, and has paid \$30 per share in dividends; the Eureka Consolidated has paid a clear profit of \$30 per share; and the Raymond and Ely has paid \$22 50 per share in dividends, in addition to returning the whole of the capital invested. Only two other mines on or off the Comstock (Belcher and Crown Point) can show as good a record in this respect, if we consider the profits per share; and only four mines out of the twenty-five on the Comstock can show as large a net profit. Those four are Belcher, Crown Point, California, and Consolidated Virginia. At the Raymond and Ely during the year 1877 there were 15,333 tons of tailings run through the mills, yielding \$5.58 per ton, and a total of \$3,35,932. The total amount of bullion yield has been \$9,655,400, being the largest yield of any mine off the Comstock. The Eureka stands next, with \$3,379,574 up to the close of the year 1877. The Eureka is, however, still yielding largely, and will soon exceed the Raymond and Ely. The ore of the Eureka averages \$10.02 per ton, and that of the Northern Belle, \$62.57. All these ores have some base metal in them, and much more of silver than gold. The Raymond and Ely has 95 per cent. of silver. Notwithstanding this and other disadvantages, its record is much more favourable to stockholders than the Ophir and the Yellow Jacket, two of the most important Comstock mines—both of which show more assessments than dividends, though the combined product of the two has been \$25,000,000.

With reference to the Comstock, a correspondent writes that the bonanza Consolidated Virginia Mine, which, as shown in last week's Journal, has paid in dividends 7,000,000, has just struck what is known as a "fine development" in the 1760 ft. level. Much is to be expected from the broad unexplored belt of vein matter still lying to the eastward of all the leading mines to the north end of the Comstock. If this newly-developed body of ore had been found anywhere else except in close proximity to the bonanza mines it would have created a profound sensation in mining circles, and a marked effect on the stock market. Had a deposit of ore 40 ft. in width, of unknown extent, north and south, and up and down, assaying far up in the hundreds, been found in Gold Hill, American Flat, or anywhere but where this gas encountered, everybody would have been wild for shares in the mine in which the strike was made, and in all other mines in the immediate neighbourhood. Being within the boundaries of the bonanza mines, however, the development scarcely creates a ripple in the tide of mining affairs, as it would seem that people have come to be surprised at nothing that is found within or about the bonanza mines. Although this splendid development has thus far been looked upon as a matter-of-course adjunct of the bonanza mines, it really has a meaning outside of them. It was found far to the east, and after passing material so discouraging in appearance that it was at one time thought hardly worth while to drift into it further. The discovery has been found under such circumstances, it is in no way at all unreasonable to suppose that other bodies lie along the lead in similar positions. Recent developments show that in a certain range in front of the Comstock bodies of good ore may be looked for—a string of bonanza.

The Eclipse Gold Mining and Quartz Company, which recently went into liquidation, appears, to judge from the reply of Mr. C. S. Nelson to the report of the meeting, published in the *Mining Journal* of Dec. 22, to have proved disastrous to the shareholders (as has been the case in by far too many American mining companies) through the shortcomings of the officials in England. The blame was, at the meeting for winding-up, alleged to rest upon Mr. Nelson, who at the time was, of course, unable to answer for himself. He now writes that the Eclipse Mine, as of course you know, is in Inyo county, California, and is a most valuable property. Mismanagement and carelessness on the part of the home directors have resulted in the collapse, for which he (Mr. Nelson), being several thousand miles away, is made the scapegoat. Two facts in reply to the imputations of incompetency and dilatoriness. From April to August of last year he kept the mine constantly running under the burden of lawsuits, attachments, labour troubles, and want of funds. Statements of how matters stood were forwarded to the home office, to none of which he received a reply. Everything went on from bad to worse until, despairing of relief, and literally unable to obtain credit, he saw the sheriff in possession, and was compelled to leave for San Francisco. Even then he has heard nothing from headquarters, and it was only from the chance remark of a third party that he learned of the reported liquidation. In the second place, he has simply to say that statements were forwarded to Finsbury-circus regularly as possible under the circumstances existing at the time, and he has since then kept them informed of vital matters relating to the mines, &c. In conclusion, Mr. Nelson adds that English capital invested as this had been would, if properly managed by the officials at headquarters, have ensured the shareholders obtaining ample returns for their money invested, and the blame of non-success is attributable to the directors, and not to their representatives in America, who offered them every assistance, though this was not availed of or appreciated.

Richmond, 7½ to 8½; the usual telegram from the mines at Eureka give the week's run at \$90,000, from 1100 tons of ore. During the week the refinery produced \$40,000. As to Mineral Hill, it is reported that work is being prosecuted with vigour on the English company's property, and Captain Plummer is making determined to develop a paying body of ore. The Queen tunnel is being extended in the hope of cutting a vein, and preparations are being made to carry the old Taylor shaft down to a still greater depth. The superintendent has quite a force of men at work, and we expect under his intelligent administration to soon hear of a rich find. The chlorides are also busily engaged, and have accumulated considerable quantities of rich ore awaiting an opportunity to have it crushed and worked.

The Market for Hydraulic or Gold Washing shares has exhibited more firmness during the week, and there has been a slight enquiry for them. There is no doubt but that the present season will be a good one. Very heavy rains have fallen during the month, and at date of last telegrams still continued. The mines throughout the State are taking advantage of the wet weather. Birdseye Creek, ½ to ¾; the last advices are good. Steady progress is being made at Neece and West claims, and work was to be commenced at the Red Dog before the month was out. Waloupa claim would be ready for water as soon as the shaft was raised. The prospects are encouraging. Blue Tent, 3 to 3½; the superintendent reports that he will now be able to wash at both South Yuba and Blue Lead, and expects in the course of the month to have the whole of the claims under operation. The *Evening Press* of Feb. 2 says: "We have been blessed with another week of rainy weather, and already the rainfall for the year foots up about 10 in. more than we had at the same time last year, and as a consequence the hydraulic miners have plenty of water, and are being paid for their long term of enforced idleness. The snow fall in the mountains, which regulates the supply of water in the summer, is much heavier this year than last, and the snow is packed and hardened. Therefore, without a doubt, a good water season is already assured, even if no more should fall, but the probabilities are that the supply will be very materially added to before spring opens."

Hultafall, 4 to 5; a report from this mine will be found in another column. The lode was turning out remarkably rich, and the 90 ft. level was in almost solid mineral—half lead and half blende. Good progress is being made with the erection of the dressing machinery, and it is hoped that it will be finished by the end of this month.

Lead mines continue to be fairly maintained. Among other indications pointing to an improved price for lead an American authority writes that "with improved machinery the lead mine owners of Great Britain will soon be able to supply their own markets, and if they lack a few tons the mines of Spain and Italy can let them have all they want. With their own mines running full blast it is not to be expected that John Bull will send his orders across the Atlantic for lead." It is considered tolerably clear that the production of lead in the American mines will henceforth be materially diminished, as statistics show it cannot at present prices be brought into successful competition with lead produced in this country. The enquiry now being seriously made in Nevada and Utah is fraught with significance—"Why work lead mines at a loss when we can prospect for silver, and work more vigorously the rich mines already in our possession? Let lead be left alone while we have all that we can possibly attend to in the development of our silver mines; and very profitable business indeed our miners find it." While this is not so encouraging to English holders in base metal American mines as might be wished, owners of home lead mines will accept it with satisfaction, remembering that the price of lead here has since June last been lowered in the expectation of increasing American imports. The advices from the Eureka dis-

trict state that at the nominal prices at which lead is quoted there is no profit in shipping, but the crude bullion sent to the Eastern refineries paid a small profit after deducting freight, cost of refining, &c.

Van, 28 to 30; the 105 west is improving as driving is continued. The 90 west has further improved, now worth 100% per cubic fathom. The sinking of the shaft is progressing satisfactorily, the lode continuing very strong and masterly, and contains a good mixture of lead and blende. New Bronfloyd, 3½ to 4; the last transaction at this rate was completed before the rich discovery in the 52. It is satisfactory to find that the new shares of the company, issued this month, are being taken up by the shareholders at par. Grogwinion, 3½ to 4, ex div.; the No. 4 lode, in the intermediate and 56 fm. levels has lately opened out in a striking manner, yielding large quantities of lead. The winze sinking below the deep adit, in No. 3 lode, continues to go down in good ore worth nearly 2 tons per fathom. It is already sunk about 8 fms., and shows great uniformity for the whole distance, with every probability of further improvement. Wye Valley, 2 to 2½; the bottom level is passing through very favourable ground, and particularly going eastward, where some nice ore has been taken out. Tippet's shaft is also going down in a remarkably fine run of ground. The prospects altogether have lately much improved.

West Wye Valley, 3½ to 4½; a second parcel of 40 tons of lead is now ready for sale. The stopes continue to yield very good ore in large quantities, and the various discoveries in the mine continue to improve. Brooke's shaft has now been sunk for a new 52 fm. level, and the lode maintains its favourable character. Prospects are excellent at all points. Caron, 2½ to 2¾; the lode in the bottom level has further improved, and is producing good ore in paying quantities. The surface works are progressing well, and the machinery will be erected without delay. Red Rock, 2 to 2½; the second parcel of lead from this mine—40 tons—has been sampled for sale. The new discovery in the 60 east continues to open out well; it has been driven upon for a considerable distance, and maintains its productive-ness, and will yield a large amount of valuable ore. The other points of operation are all giving great satisfaction, and a good deal of reserve ground is being accumulated. St. Harmon, 2 to 3; the general appearance of the mine has undergone a marked improvement, the lode in the deep level showing signs of quickly becoming very productive, and the cross-cut towards the south lodes making good headway in promising ground. South Comynwith, 3 to 4; the stopes are yielding abundance of lead, and the levels are blocked with ore waiting for the crusher, which had to stop working on account of a flood having broken the dam across the river, but a new one is now being constructed, and the manager expects to be able to make his first sale of lead shortly. McIndur, 3½ to 1½; additional capital having been subscribed, steps will be at once taken to prove the south lodes in an effective manner.

Pateley Bridge, 3 to 4; the Rake vein in the 30 east is worth 2 tons of lead ore per fathom; ground favourable for driving. The western end on the same level keeps improving as the run of ore gone down in the 20 is approached. Other parts unchanged, and smelting progressing well. West Pateley, 2 to 2½; progress continues to be made at the Craven Cross shaft, where it is expected important discoveries will be made if any reliance is to be placed on records in the immediate districts. Court Grange, 1 to 1½; the bottom of the mine is opening out very rich for lead; lode maintaining its value of 40% per fathom. The other levels are looking well, and producing good quantities of mineral.

Subjoined are the closing quotations:—Asheton, ¼ to 1; Carn Brea, 40 to 42; Devon Great Consols, 3 to 3½; Dolcoath, 30 to 32; East Caradon, ¾ to 5%; East Van, 1½ to 2½; Glenroy, ¾ to ¾; Great Laxey, 20 to 22; Hingston Down Consols, ¾ to ¾; Leadhills, 3½ to 4; Marke Valley, ½ to ¾; Parys Mountain, ¾ to ¾; Penrithall, 4s. to 6s.; Roman Gravel, 2½ to 3½; St. Andrew, ¾ to 1; Tankerville, 3½ to 4½; Tintoft, 1½ to 12; Van, 2½ to 3½; West Asheton, ¾ to ¾; West Chiverton, 13 to 14; West Pateley, 2 to 2½; West Tankerville, ¾ to ¾; Wheel Crebor, ¾ to 1; Wheel Grenville, 2½ to 3; Almada and Tiritio, 3-16ths to 5-16ths; Birdseye, ¾ to ¾; Blue Tent, 3 to 3½; Cape Copper, 32 to 33; Cedar Creek, ½ to ¾; Chontales, ¾ to ¾; Colorado Terrible, 1½ to 1¾; Don Pedro, ½ to ¾; Eberhardt and Aurora, 6½ to 6¾; Exchequer, ¾ to ¾; Flagstaff, ¾ to ¾; Frontino (and Bolivia, 1½ to 2½; Hultafall, 5 to 5½; I.X.L., ½ to ¾; Javali, ¾ to ¾; Kapanga, ¾ to 1; Last Chance, ¾ to 1; New Quebrada, 1½ to 2; Oregon Preference, 4 to 4½; Pastorena, 3-16 to 5-16; Pumas Eureka, 2½ to 3; Port Phillip, 1-16 to 3; Richmond Consolidated, 7½ to 8½; St. John del Rey, 320 to 330; San Pedro, 1-16 to 3-16; Sierra Buena, 1½ to 1¾; South Aurora, 3-16ths to 5-16ths; Tecoma, ¾ to ¾; United Mexican, 2½ to 3.

COLLIERIES.—A slightly improved enquiry has been discernible for the past week in colliery shares, but there are no changes of any consequence to note. The uncertainty in which the issue of the Eastern Question remains is sure to affect this as well as all other share markets, and improvement, for the present at all events, must be gradual. In some districts the coal trade is looking up a little, and increased demand is pretty generally the rule for gas and steam purposes, while manufacturing coal is finding a brisker market. There are palpable signs of better times coming in the iron and steel trades, and an improvement in these will of course react on the coal trade. Exports, too, are growing considerably, especially from the South Wales ports, and to India and Brazil. Newport (Mon.) alone exported during last month 9157 tons of iron, against 2985 tons in January of last year; while Cardiff figures are 4989 and 5322 tons, and Swansea 1900 and 225 tons for the respective months. Several Government contracts for steam coal have lately been in the market, and the shipments of coal generally, particularly in South Wales, continue to increase. The proposed new line of railway to be constructed by the Great Eastern Railway will materially benefit South Yorkshire collieries by introducing a wholesome competition, which will bring down coal freights to London. The annual report of the Holmes Colliery Company has been issued, and is good evidence of the great difficulties with which coal owners have had to contend, the result of the year's working being a loss of 405%. Indeed, there are few collieries which can show very much more satisfactory returns, the majority of them being either at a loss or only a bare profit. Chapel House, which is a notable exception to the rule, is reported to be doing well, and returning satisfactory profits, and it is anticipated that this colliery will soon be earning at the rate of between 20,000, and 30,000% per annum. The shares keep steady at about 3 to 3½, but will probably rise so soon as the investing public find out the improved position of the concern since the new shafts have been completed. Alltami shares are 4 to 5; good progress is reported at Section D, to which portion of the property the principal operations are being confined until such time as trade improves and the new railway is made. Llay Hall remains at 8 to 10; the daily returns at the colliery are stated to be satisfactory. Cakemore, 5; Cardiff and Swansea, 1 to 1½; New Sharston, 3½ to 3¾; Thorp's Gawber, 2½ to 2¾; Consett, 17½ to 17¾.

At Redruth Ticketing, on Thursday, 2637 tons of copper ore were sold, realising 8403L 14s. 6d. The particulars of the sale were—Average standard, 977. 8s.; average produce, 6½; average price per ton, 3L 3s. 6d.; quantity of fine copper, 106 tons 15 cwt. The following are the particulars:—

Date.	Tons.	Standard.	Produce.	Per ton.	Per unit.	Ore copper.
Jan. 17.	2782	£ 94 0	6 ¾	£ 12 6	10s 8 ¾	£ 12 0
" 21.	1273	" 81 0	" 6 ¾	" 4 6	" 10 11	" 5 3
Feb. 21.	2637	" 97 8	" 6 ½	" 3 0	" 10 4 ½	" 51 17

Compared with the last sale, the advance has been in the standard 5s., and in the price per ton of ore about 4d.

SOUTH DAREEN.—There are several valuable improvements at this mine. In the 100 west there is a strong lode, with a good mixture of lead, worth already 8L per fathom, and expected to be better. The winze below the 90 is worth 40L to 50L per fathom, and the stopes in this level 25L per fathom. In the 80 the lode has greatly improved in size and value, now worth 25L per fathom, and the stopes continue good. A new 60 ft. pumping-wheel, a 25 horse-power steam-engine and boiler for use in dry and frosty weather, and Green's patent dressing machinery have just been erected. The shaft has been fitted with new drawing-machine and double skipway, so that the mine is now in a far better state for efficient and continuous working than it ever has been before. The returns already give a profit of about 300% a month, and these are likely to be soon increased, and dividends resumed. There are 9000 shares of 30s. each, making the whole capital only 13,500L; but the late company expended besides a much larger sum, from which the present shareholders derive the benefit.

HINGSTON DOWN CONSOLS.—An important discovery has been made in the bottom of this mine. Bailey's shaft has reached the depth of 172 fms., and in driving east in the present bottom a good course of ore has been met with. The courses of ore laid open in this mine have for several years past been westward; the present discovery to the east of the shaft is, therefore, looked upon with much interest, the chances being that further discoveries will be made in the development of the great lode leading away into a long tract of unexplored ground in that direction.

LLAN GAN.—Since Capt. W. Michell took charge of these mines a marked improvement has taken place. The whole of the lead getting has been taken on tribute, which alone speaks well for the mine, but in addition to this and the other developments a chute of lead has been discovered on Wright's lode, now worth 12 cwt. of lead ore per fathom, and improving, and, judging from the indications, it is expected to have a run of good ore-ground between the old engine-shaft and Wright's.

YSTUMTEAN.—The lead ore discovered in No. 3 level west, on the north wall of the lode by cross-cut, still continues west and also east of the cross-cuts, all in whole ground 40 fms. under surface and 30 fms. above adit. This is considered most important.

Did.—On Dec. 13 last, at Smeddle and Co.'s Mines, near Libertad (Nicaragua), and interred in the cemetery at that place, GEORGE S. ELLIS, Esq., late cashier at the Chontales Consolidated Company's Mines. Much regretted.

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COPY OF REPORT.

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"I am, dear Sir, yours faithfully, S. L. BENSUSAN, Esq. (Signed) S. ZOLLNER."

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## Notices to Correspondents.

\* Much inconvenience having arisen in consequence of several of the Numbers during the past year being out of print, we recommend that the Journal should be filed on receipt; it then forms an accumulating useful work of reference.

ADVERTISEMENT AGENCY.—The services of a gentleman, having a connection amongst engineers and manufacturers, are required in connection with an influential continental journal.—L. C.

SHARE DEALING.—We never interfere in the sale or purchase of shares; neither do we recommend any particular mine for investment or speculation, or broker through whom business should be transacted. The addresses of most of the latter appear in our advertising columns.

Received.—"B. and N." (New York)—"Reader" (Utah): The matter shall be fully referred to when the information comes to hand.—"Shareholder" (Flagstaff) should make the enquiries at the office.—"E. B." (Twyford): The letter has been forwarded.—"W. T." (Ballydoob)—"Shareholder" (Wheat Uny)—"T. P."—"J. H." (Bridgend)—"C. W." (Wigan)—"O. D." (Leadhills)—"Constant Reader" (Bristol)—"C. N." (Holmshush): The letter cannot be inserted, as the petition for winding-up the company has been withdrawn.

## THE MINING JOURNAL.

Railway and Commercial Gazette.

LONDON, FEBRUARY 23, 1878.

## IRON, STEEL, AND COAL EXPORTS.

So far as the extent of our exports is concerned, the year may be said to have opened out favourably, but so much cannot be said when we come to look at their values, in which there has been a decline. It is a noticeable fact, as showing the growing demand for steel that is now going on, that our imports of hematite ore have grown most rapidly, for in January, 1876, they were 24,173 tons; in January, 1877, they had advanced to 37,311 tons; and last month they were 73,379 tons, an increase of 300 per cent. over the first month of 1876. Our imports of manufactured iron last month were also in excess of those for January, 1877, whilst prices were lower. In lead there was imported in January last 9836 tons, of the average value of 20l. 12s. per ton, against 7898 tons in the same month of last year, when the price was 21l. 13s. per ton. But the decrease in the values of our imports, as taken per ton, is also the case with respect to our exports of iron, steel, coal, and most other commodities. In pig-iron there was a slight decline, but prices fell off from 3l. 2s. per ton in January, 1877, to 2l. 13s. 9d. in 1878. This shows that our ironmasters have had a hard time of it, and have been working at prices that cannot have been remunerative. Our exports of railway iron of every description in January of last year was 17,016 tons, but last month it was 31,832 tons. This large increase was principally for British India, to which country in January, 1877, we sent 1727 tons, but last month the quantity was 18,460 tons, whilst Australia also advanced from 3356 to 5985 tons. In 1877, however, the price was 8l. 10s. per ton, against 6l. 6s. in 1878, showing a very serious falling off indeed. Of steel rails last month there was sent to British India 3899 tons; Australia, 2236 tons; Russia, 45 tons; Germany, 407 tons; Spain, 609 tons; Chili, 15 tons; and other countries, 1056 tons; making a total of 7266 tons, against 6794 tons for the corresponding period of 1877.

Owing to the demand for steam-engines for India, the exports would have been very low indeed when put side by side with those of the first month of last year, but they are low as it is, the value in January, 1877, having been 191,987l., against 162,519l. last month, of which India is credited with 78,324l. against 22,963l. for January, 1877. There was a great falling off as respects Italy, Australia, France, and Germany. Considering the state of affairs in the eastern part of Europe, and the unsettled condition of affairs in Russia, which has been a good customer of ours for steel and other products, our exports of coal are much better than might have been expected, but prices show a decline. The following shows the tonnage sent away during the month of January for the three years; the total value and the charge per ton were as follows:—

Tons.	Value—£.	Per ton—s. d.
1876 ..... 1,133,740	670,936	11 10
1877 ..... 950,923	502,862	10 7
1878 ..... 1,012,542	494,340	9 9

A falling off in the value of coal so heavy as is shown above plainly indicates the state of the trade, the competition, and the sacrifices that must have been made by our English colliery owners to hold their own in the continental and other foreign markets. Germany took less from us last month than usual, and this is only what might be expected, seeing that her own coal fields are being rapidly developed, and a trade established at the ports in the North Sea. The reductions in wages that have taken place, it will be seen, were absolutely necessary, and were by no means equal to the reductions in prices that manufacturers and coalowners were obliged to submit to.

## MINING EXPLOSIONS.

As we are likely before long to have the question of explosions in mines, and the means of averting them, discussed in the House of Commons by those who cannot be said to be practically acquainted with matters of such importance to workmen and owners of mines, it may not be out of place to direct attention to the many difficulties surrounding the detection of gas at times. It has been urged by some gentlemen that explosions of fire-damp are really preventable, but this opinion is not shared in by our practical mining engineers, who are agreed that outbursts of gas in vast quantities take place so suddenly, and from places the least suspected, that no possible amount of ventilation could clear them away, or render them harmless. But such gas we find in many instances does not come directly from the coal seams, but is pent up in other strata, so that once the great pressure overlying it is removed it comes out in a very large volume. This we have shown in former notices to have been the case more particularly in collieries in Yorkshire and in the North of England, where gas has come from the floor, or below it in a stream, with the noise of a high-pressure engine. A singular instance of this took place recently in No. 7 shaft of the Cnocordia Colliery Company at Niederolsnitz, and communicated to the Mining Association at Freiberg. Of such importance was this report considered that it was recently translated for the benefit of our English mining engineers. It appears that in sinking to the coal the men had got down 553 yards, where four of the sinkers were working in the bottom. They had charged three bore-holes, two with dynamite cartridge and one with powder, which had been sent down in a box with a sliding lid. The fuse was then lighted, and the men went up 24 yards to a ladder platform, below which there was a scaffold for protection. Two of the shots went off, and the hiss of the third fuse was heard, and this was immediately followed by an explosion by which three of the men were killed. At the time of the explosion the bottom of the shaft was 65 yards above the coal measures. The death of the three men was caused by rupture of the small vessels of the lungs owing to the violent rush of air at the explosion. In the shaft, 33 yards from the bottom, several cross-timbers were blown out, and the timbering more or less displaced, while the ladder platform was covered with large stones. On an examination being made it was found that below a depth of 548 yards the walls of the shaft were completely shattered, whilst between the depths of 549 yards and 551 yards a long narrow hole 6 ft. 6 in. high and 4 ft. 11 in. broad extended into the rock fully 8 yards towards the south-east from the shaft. There was a continuous discharge of gas, accompanied by puffing noises. The analysis of the gas first discharged gave 93.47 per cent. of nitrogen by volume, and 5.79 per cent. of carbonic acid, and 1.40 to 1.67 hydrogen. The later discharge gave 85.03 to 85.59 nitrogen and 14.27 to 14.80 fire-damp, with 0.15 carbonic acid.

The writer of the paper put it to the members of the Association as to whether they knew of any similar case where an explosion left behind and was followed by gases consisting essentially of nitrogen,

and whether the gas discharged after the explosion could be accounted for as the product of the decomposition of any known material. The first question was decided in the negative, whilst it was pointed out that gas rich in nitrogen was known to be produced by the decomposition of blasting material, whilst some of the West-phalian coals give off gases containing 90 per cent. and upwards of nitrogen, with a small admixture of carbonic acid and fire-damp. The gases alluded to, according to Von Meyer's view, might be considered as having been partly produced during the formation of the coal and as partly consisting of atmospheric air from which the coal had abstracted the oxygen—a power which Richter states many coals undoubtedly possess. As to the cause of the explosion, Professor Winkler gave it as his opinion that there was a cavity in the rocks overlying the coal measures filled with highly compressed gas, and that the walls of the hole were at last so far weakened by the sinking of the shaft that the tension of the gas became able to break through them. The after discharge of gas he thought came from smaller cavities adjoining, the contents of which were able to escape through the fissures in the rocks which had been shattered by the explosion. Here there was an explosion of a most unusual character, the cause of which is merely conjectural, and which it was impossible to anticipate or be prepared for, whilst no similar case has been recorded. In England, also, we have had sudden outbursts of gas, the actual cause of which has not been cleared up, and there is no doubt that in the working of coal mines we shall on occasions have phenomena brought under our notice that will puzzle our ablest mining engineers to account for. Gas will at times be discharged of a sudden that will set at defiance all ordinary rules of ventilation, as it has done on many occasions. Now, then, it may well be asked, can legislation effect what it is not in the power of the ablest and most vigilant of mining engineers to accomplish. Ordinary explosions in some few instances may be the result of neglect on the part of either a workman or an official, but the Mines Regulation Act of 1872 is in every way sufficiently stringent to meet and punish all such offenders. Any further legislation in the same direction must fail in giving increased security to those working in mines so far as it relates to the prevention of explosions, and can only tend to harass those to whom the management of collieries is entrusted. The ventilation of a mine can no more be improved by Act of Parliament than can such an explosion as that we have been drawing attention to be anticipated by the ablest and most scientific of mining engineers.

## OUR COAL ABROAD.

The demand for our coal in foreign countries and our colonies was on a large scale last month, having amounted to 1,012,542 tons, as compared with 950,923 tons in January, 1877, and 1,133,740 tons in January, 1876. In these totals the exports to France figured for 286,763 tons, 262,869 tons, and 352,954 tons respectively, so that notwithstanding the stagnant condition of French commerce and enterprise the French are still importing our black diamonds very freely. On the other hand, the exports of coal to Germany exhibited a rather sensible contraction in the first month of this year, the shipments in that direction having only amounted to 38,940 tons, as compared with 40,912 tons in January, 1877, and 51,419 tons in January, 1876. It would appear that the efforts which the Germans have been making to increase the extraction of coal from their own soil, and to enlarge the demand for it when brought to bank, are already beginning to bear some fruit; at any rate, the consumption of English coal in Germany will be seen to have been upon a comparatively restricted scale in January. The shipments of our coal to Russia in January were relatively small, having been only 2557 tons, while in January, 1877, they were 14,744 tons, and in January, 1876, 17,072 tons. The shipments to Spain and Italy, when combined together, presented little variation in January this year when compared with January, 1877, although they exhibited, upon the whole, some increase. The shipments to Malta rose from 22,056 tons in January, 1876, to 28,959 tons in January, 1877, and 33,058 tons in January, 1878. The prosperity and gradual extension of the Indian railway system has led to a large increase in the exports of our coal to our great eastern empire. Thus while in January, 1876, we sent British India 44,011 tons of coal the shipments rose in January, 1877, to 85,365 tons, and in January, 1878, they further expanded to 86,392 tons. Altogether it will be seen that the export coal trade of Great Britain, although well maintained, upon the whole, was subject in the first month of this year to very great fluctuations, although the progress made in some directions compensated, and even more than compensated, for the ground lost in others.

The statistics which we have thus far been analysing relate solely to the direct exports of coal from our shores in the first month of each of the last three years; the figures embracing also, it should be observed, coke, cinders, and patent fuel. Account should, however, be also taken of coal, &c., shipped for the use of steamers engaged in the foreign trade. These latter shipments amounted in January to 290,201 tons, while in January, 1877 they stood at 292,710 tons, and in January, 1876, at 265,482 tons. In one form or another the exports of coal from Great Britain in the first months of the last three years were accordingly as follows:—January, 1876, 1,390,222 tons; January, 1877, 1,243,633 tons; and January, 1878, 1,311,743 tons. At this rate our coal exports are marching on this year to the extent of 15,740,916 tons per annum. This total would compare as follows with the corresponding figures for each of the four previous years:—1874, 17,049,341 tons; 1875, 17,823,165 tons; 1876, 19,863,601 tons; 1877, 19,020,380 tons; and 1878 (estimated), 15,740,916 tons. *Prima facie*, there would thus appear to be a probability of a rather sharp decline in the external consumption of our coal this year; but it should be remembered that the exports are necessarily upon a reduced scale during the winter months. The closing of the Baltic navigation, for instance, has a very considerable effect upon the shipments of our coal to Russia; and this has been especially the case this year, in consequence of the blockade of the Southern Russian ports by reason of the Russo-Turkish War.

The marked reduction which has taken place in the price of coal is clearly illustrated by the fact that the 1,012,542 tons exported directly in January this year were priced at only 494,340l., while the 950,923 tons exported directly in January, 1877, represented a value of 502,862l.

GOLD MINING IN VICTORIA.—From the reports of the Mining Surveyors and Registrars for the quarter ended Sept. 30, 1877, with a copy of which we have been favoured by Major THOMAS COUCHMAN, the Secretary for Mines, it appears that during the quarter reported upon the number of miners employed was 39,071; of these 13,997 Europeans and 10,077 Chinese were employed in alluvial mining, and 14,870 Europeans and 127 Chinese in quartz mining. The approximate value of the mining plant in use was 1,967,234l. The total quantities of gold got during the first nine months of the year were:—

	Alluvial. Ozs. dwts.	Quartz. Ozs. dwts.	Total. Ozs. dwts.
March quarter .....	61,358 4	121,432 14	182,790 18
June " .....	72,784 6	128,284 13	201,068 19
Sept. " .....	77,106 4	130,527 19	207,634 3

As to the produce of the mineral treated, 264,714½ tons of quartz were crushed, and yielded 119,685½ ozs. of gold, or at the rate of 9 dwts. 1.02 grs. per ton; 5930 tons of quartz tailings and mullock yielded 602½ ozs. of gold, or at the rate of 2 dwts. 0.75 grs. per ton; and 2707½ tons of pyrites and blanketing were operated on, and yielded 3981½ ozs. of gold, or at the rate of 1 oz. 9 dwts. 9.82 grs. per ton. A seam of coal has been found lately at the head of Tyler's Creek in the Traralgon Subdivision; it is intended to use it if it will answer the purpose in smelting the copper ore at Cooper's Creek. In Stringer's Creek division no smelting has been done at the Walhalla Copper Company's works during the quarter, owing to their having run short of fuel, and pending arrangements for a less costly mode of transit of the ore. The mine continues about the same. In the Waranga north subdivision the U. and F. Company, Old Albert Reef Whroo are mining for antimony; the reef is increasing in thickness, and looks well, and at the Black Cloud Reef at Coy's diggings work will be resumed

in a few days, a small engine being on the ground. In the Beechworth division 18½ tons of tin ore were obtained. In an appendix several specimens of Wilkensonia bituminata are figured in connection with Baron von Müller's Observations on New Vegetable Fossils of the Auriferous Drifts.

SALE OF AUSTRALIAN COPPER.—On Tuesday, Messrs. James and Shakspeare, metal brokers, of London and Liverpool, held a great sale of Wallaroo copper at the Baltic Sale Room. There was a large attendance of metal merchants, brokers, and manufacturers from all parts of the kingdom, the Birmingham gun and cartridge manufacturers, Sheffield electrotypers, and indeed all the principal centres of the metal trade of the country, being largely represented, either directly or through brokers. The sale was conducted by Mr. H. K. James, and in opening the business he said he might just mention that since they had commenced these sales of Wallaroo copper they had disposed of 8957 tons, of which only 322 tons now remained in stock, 282 tons thereof being in cakes and 40 tons in ingots. He proposed to offer at this sale 734 tons, of which 590 tons were in cakes and 144 tons in ingots; so that there was a total of 1172 tons of this copper available up to May 1 next. Up to that day the importers bound themselves not to dispose of any of the metal either privately or publicly. On Nov. 6 last there were 174 tons in second hands from previous sales, and deducting 438 tons now in store 1266 tons were left for delivery since that day. Taking the same period to elapse between now and the next sale, there were only 1722 tons to meet similar demands, whilst, as every one knew, the spring sales were expected to be larger than ever. Gentlemen might seem surprised, but Russia might get this copper if she choose *via* the Port of Revel, and no doubt there would be plenty of people ready to swear that it was not to be used for warlike purposes. The conditions of sale were much the same as usual, the only point calling for mention being that the importers undertook not to sell any copper by private contract or otherwise before May 1 next. The sale then commenced, the cakes being started at 73l. per ton, and the first lot being knocked down at 74l. The highest price realised for cakes was 76l. per ton, and the average was 75l. 16s. per ton. Ingots were started 75l. 10s. per ton, and the first lot was knocked down at 76l. The average for ingots was 75l. 10s., and the average price for the whole of the copper sold was 75l. 18s. The average price at the sale in November was 79l. 2s. 8d., or 79l. 0s. 6d. for cakes, and 79l. 13s. 6d. for ingots.

ENGLISH MINING, AND FRENCH CAPITALISTS.—Some months ago (a correspondent writes) a series of articles on British Mining appeared in the French paper *Le Charbon*, and seem to have caused no little excitement among the capitalists of Paris, who of late have been among the principal buyers of shares in the best dividend lead mines. A number of these capitalists have also been negotiating for the purchase of the entirety of D'Eresby Mountain and the D'Eresby Consols Mines; and during the past week one of them has been in England with a view to come to terms. But the directors of D'Eresby Mountain have considered that, even had they the power to sell the property without the consent of every shareholder, the great prospects that the mine presents would not justify them in recommending the sale even at the high terms offered. The shares in the present company can be sub-divided—that is, made from 512 to 10,240 to meet the requirements of both the French and English markets, and this is the way it is understood the matter has been left. With regard to D'Eresby Consols, a mine of equal promise, the vendors some months ago placed it entirely in the hands of Messrs. Watson Brothers, through whom the negotiations have proceeded, and, as they had already promised their friends an interest in it on certain terms, they declined to dispose of the whole concern on even more advantageous terms, but both the French and English capitalists will have the opportunity of joining their company.

TUNNELING AND EXCAVATING MACHINE.—MR. HAWLEY N. CARGILL, of Grand Rapids, Michigan, has patented an invention for tunnelling and excavating. The machine is constructed with a cylindrical case or shield, having a concave socket to which the convex portion of an interior case is fitted. The latter carries the excavating mechanism. Within it there are two concentric drums, the outer one of which rotates in contact with longitudinal rollers carried by the case, and the inner one rotates with the outer one, and is capable of sliding longitudinally in it, being guided and supported by friction rollers. To the rear end of this drum a chain wheel is secured for receiving the driving chain, and to its front end a series of cutters are attached. A shaft carrying an earth auger is journaled in the centre of the inner drum, and there are suitable devices for operating and adjusting the various parts.

MANUFACTURE OF IRON AND STEEL.—Some ten or twelve years since it was ascertained by Mr. John Giers, of Middlesborough, that by working crude iron or re-melted pig-iron in the ordinary puddling furnace (using fuel in the ordinary way), with the assistance of a rich, pure, iron cinder, nearly all the phosphorus was removed while the metal was yet in a fluid state, and at a time when only a portion of the carbon was eliminated. Taking advantage of this he patented in December, 1867, a process according to which he proposed to transfer the metal so purified (which he calls crude steel metal) whilst yet in a fluid state into the open hearth of a reverberatory furnace, and in such furnace to effect the further removal of carbon necessary to bring such crude steel metal into a state to form malleable steel. In practice, however, the ordinary puddling furnace was found unsuitable, and hand labour not fully reliable for the production of the crude steel metal; he, therefore, now proposes to treat the melted pig, or crude iron, in a vessel lined with oxidising fettling containing rich oxides of iron, and in such vessel he maintains combustion by the use of air blast without the aid of fuel (except such as may be necessary for heating the blast) simultaneously, causing alternately the surface of the fettling to be acted upon by the oxygen in the blast and the metal constituting the bath to be acted upon by the surface of the fettling. The apparatus employed may be a revolving chamber capable of being entirely closed, and isolated from external influences. In this vessel the heat will be sustained entirely by the oxidation or combustion of the carbon in the crude iron, the escape hole being regulated to such a size as by preference always to form a plenum of pressure inside the chamber. The rationale of the process is that the whole of the impurities in the crude iron, including carbon, have to be removed by a process of oxidation; indirectly through the fettling the oxide of iron in revolving comes in contact with the bath. As the surface of the fettling revolves out of the bath it does not, as in the ordinary revolving puddling furnace, come in contact with a carbonaceous flame, but with highly heated atmospheric air.

IMPROVEMENTS IN PUMPS.—With a view to secure advantages over the centrifugal pump without the disadvantages inherent in that system of pump, such, for instance, as the throttling action on the water inlet, and the consequently increasing leakage consequent on the wearing of the face joints, and the great expense of construction, owing to there being so many parts which require careful fitting and constant renewal in the centrifugal pump, Mr. R. C. PARSONS, of Connaught-place, proposes to make the pump case for a certain portion of its length cylindrical, and give the same a conical extension outwards at both ends to facilitate the admission to and discharge of water therefrom. In the cylindrical portion of the casing he mounts a fan consisting of a central cylindrical core, carrying on its periphery helical blades which extend from end to end thereof. Immediately above this fan is a fixed cylindrical core of the same diameter as that of the fan, and to it are fitted helical blades set in the opposite direction to those of the fan, and forming guides for the passage upwards of the water which is raised by the rotation of the fan. These blades fit as close as may be to the cylindrical casing. The fixed core is closed at its upper end by a conical extension, which is rigidly attached to the outer casing, and carries at its apex a bearing for the fan spindle. Below the fan, and also rigidly attached to the outer casing, is an inverted cone, the base of which corresponds in diameter to that of the core of the fan. This cone carries a step bearing for the lower end of the fan spindle. In working this pump it is immersed in water to a level slightly above



the lower extremities of the guide blades, and on rotating the fan the water flows up the fan and guide blades, and fills the casing above, which is provided with a suitable orifice for the discharge of the water. The principle upon which this pump works is that of impact, the blades of the fan serving to scoop up the water in which they are immersed, and to throw it up in a vertical direction, at the same time generating in it a considerable rotary motion. This rotary motion is arrested by the fixed guide blades which form inclined planes for the easy ascent of the water. The pump may if desired be constructed with more than one set of fan and guide blades on the same spindle or shaft, and the advantage of increasing the number of these sets of blades is that a pump thus constructed can be made to raise water to any required lift without increasing the speed of the rotation of the fan spindles.

**THERMO-PNEUMATIC LUBRICATOR.**—In the holder for the glass bottle containing the oil, which is somewhat similar in form to that used with Leuvin's needle lubricator, Mr. S. BICKERTON, of Ashton-under-Lyne, proposes to place a moveable valve composed of a ball or disc (made of glass or any other suitable substance). This ball or disc, by preference a ball, falls into a seating in the holder when in use, the said seating having a slight opening or slit to prevent the ball from being absolutely oil and air-tight, and the use of the ball is to open and close, or partially close, the passage in the lubricator so as to prevent too large a supply of oil. By the arrangement adopted he is enabled to use a much larger opening in the holder for filling the bottle with the lubricant without wasting time and oil, and when the bottles are inverted for use the ball falls into its seating, and closes or partially closes the aperture, leaving only enough space for the oil to pass to the place desired. For oiling the necks of tin rollers he fixes a cover with a hole in the centre, made of any suitable material, which cover is driven into the bonnet, and is for the purpose of keeping the holder and glass bottle firmly in their places.

#### REPORT FROM CORNWALL.

Feb. 21.—With the more hopeful aspect of the Eastern Question there is a more assured feeling of hope in mining circles that the better days are not so far off as they seemed a week or two since. It is, however, but hope expectant, and by no means hope realised for the price of produce and of shares remain, some minor fluctuations excepted, just where they were. The severest pinch of the present evil times is, unquestionably, being felt in the extreme West. The stoppage of Ding Dong has been a most serious matter for the working miner, and in St. Just mining is so depressed that, although agents have done all they can for the men in the way of giving tribute, the wages earnable are nothing more in many cases than starvation. Whatever was the case some months since when the alarm was first raised there is no doubt that now at least, and certainly in this district, ample scope for the organisation of a system of relief. The area of distress may not be as wide, nor the members involved so great, but the pressure is certainly more severe now in the Far West of Cornwall than it ever has been in South Wales. And this be it remembered among a population against whom no charge can be made, who have patiently and earnestly struggled on trying to do their best, and hoping always that they might tide over those adverse circumstances. Near to the great arsenal of Devonport as Cornwall is, the greater activity in the dockyard there and the number of men taken on can exert no appreciable influence on the dearth of labour common throughout the county, which has thus no compensation whatever for the evils that even threatened war entails.

Mining matters as affecting the various mines individually afford very little material for comment. At Wheal Russell, near Tavistock, there have been a couple of discoveries of importance, and in other respects our copper mines generally seem to be looking well. Brookwood, it is hoped, will shortly be in for the bottom; the water is now below the 70 fm. level.

A curious case connected with the sale of a china clay works in St. Neot has come before the Chancery Division of the High Court of Justice. It turns upon the hearing of the contract and the conditions under which the sale was made, the allegations being that the plaintiff had been induced to buy a half-share in the works by misrepresentation as to the quality of the clay, the extent of the machinery, the distance from the rail, &c. A good many have burnt their fingers over clay works lately.

The Cornwall Railway Company has been singular in its experience during the past half-year. While our mines have been suffering under a depression almost unparalleled, it has actually increased its receipts on ordinary traffic by 117%, which leaves a balance of 759L to the good after deducting a decrease of 356L as compared with the corresponding half-year on passenger receipts. There has also been a reduction of 2418L in the working expenses, and thus the deficit in the amount required to pay the preference interest has fallen from 5582L in the second half of 1876 to 2433L. This deficit has to be made up by the Great Western Company, as representing what were formerly the associated broad gauge companies, and in this way up to the present time 160,000L has been so advanced. Hitherto the ordinary shareholders in the Cornwall Company have received nothing, but an arrangement has now been made with the Great Western Company by which the line will be worked more cheaply, and the interest on the accumulated deficit foregone until the ordinary shareholders have received 3 per cent. Mr. Tweedy, the Chairman of the board, has explained, in a circular addressed to the shareholders, that the intention of this agreement, which is to last for ten years, is to place the working of the line in the hands of the Great Western Company, since by dealing with it as a portion of one continuous system certain expenses may be avoided, and, at the same time, it is expected that more extended facilities will lead to increased receipts from traffic. The working of the line, the maintenance excepted, will be entirely in the Great Western's hands, leaving to their officials the charge of the locomotive and traffic departments, of the repairs and running of carriages and wagons, and the fixing of through trains, rates, fares, &c. The Great Western Company propose to charge the Cornwall Company for the outlay incurred by them, a sum amounting to 30 per cent. of the gross receipts earned, and agree that the charge shall include all expenses of stations at Plymouth, of advertising, of the telegraph, of the railway clearing-house, and all sums paid for compensation for loss or damage to goods and parcels. The items as above cost in the three years ended December, 1877, 131,146L. The gross receipts during the same period were 386,018L; 30 per cent. of which would have been 115,805L. Had the proposed arrangement been then in force the saving of expense to the Cornwall proprietors would have amounted to 15,342L in the three years in question. Mr. Tweedy reminds the shareholders that the line is already leased to the associated companies, now represented by the Great Western, under terms which rank the accumulated deficit of 160,000L next for dividend after the preference interest, and before the dividends on ordinary capital. The Great Western Company, subject to this agreement meeting approval, forego during the next ten years the claim they have for these accumulated deficits until the ordinary shareholders have received dividends to the amount of 3 per cent. per annum. If, under these circumstances, the result in any one year should be that this company is still unable to meet its fixed interest charges, the deficiency will be paid by the Great Western Company as heretofore, and the amount added to the debt due to them for similar payments. Should there, however, be a balance of profit in any one year, the full amount is to be divided among the ordinary shareholders, without deduction for previous losses or interest.

The Falmouth Docks Company has by no means such a satisfactory report to make, and this makes the success of the Cornwall line still more remarkable. The profit at the docks for the half-year ending Dec. 31 last has been less than for any corresponding period since 1873. The falling off has been general at the wharves, warehouses, and graving docks, arising principally from the great depression of trade, especially of the shipping interest, and from the Black Sea trade being interrupted by the war. Payments from revenue to the amount of 1000L have, however, been made to the Public Works Loan Commissioners in the half-year ending Dec. 31, making

with the payment of 4750L in the preceding half-year, a total of 5750L in the year in reduction of the arrears of interest on loans.

The sixty-fourth annual report of the Royal Geological Society of Cornwall just issued contains, in addition to the address of the president—Mr. Warrington Smyth, F.R.S.—Mr. Borlase's paper on a "new tin scheme," recommending the use of tin in the manufacture of articles of domestic utility—tea and coffee sets, &c.—and for ornaments; and Mr. J. H. Collins's paper on the Cornish elvans, which is illustrated by a coloured plate of microscopic sections of those rocks. The sixtieth annual report of the Royal Institution of Cornwall has also recently appeared, but it contains nothing of special interest in a mining sense.

#### REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Feb. 21.—The condition of the Coal Trade is unimproved. The demand keeps very considerably within the capabilities of the collieries, and much of the trade doing is barely profitable. Never have Staffordshire mineowners had greater difficulties to contend against than now. The output of pig-iron varies but little, for the effect upon stocks of the blowing-in of a furnace here and there is counteracted by the blowing-out of other furnaces. Prices are without change. The mills and forges are running with about the same regularity that has characterised them during the past three weeks or so.

The Osier Bed Iron Company, of Wolverhampton, have this week stopped their Meadow Colliery, at Portobello, near Willenhall, in consequence of their inability to cope with the underground flood, the miners having refused to work an extra hour. The two blast-furnaces of the same firm will now, as a consequence, have to go out.

Mines drainage matters continue to occupy much attention. The Bilston mineowners contend that the petition which they have presented for exemption is possessed of the requisite authority, as they assert that what is required by the Act is not that the petition should have in its favour a majority in rateable value of owners and of occupiers separately, but a majority of both combined. The Earl of Dudley, whose representative is, moreover, a Mines Drainage Commissioner, is amongst the prominent opposers of the new Bill.

A dispute has occurred at the Forest Colliery, Bloxwich, the men declaring that a wages reduction has been attempted in direct violation of the Birmingham agreement. The matter has been referred by the workpeople to the Executive of the Union.

In coal and iron properties there is no movement on the local stock exchanges, and prices continue to fall. Holders in the Sandwell Park Company are willing to sell at merely 3L premium, but buyers only offer 1L premium; 2L will buy the 10L shares of the Cannock and Huntington Company, 9L 10s. would buy the 17L 10s. shares of the Ivy House and Northwood Colliery Company, 2L 15s. would buy the 9L 10s. shares of the Spon Lane Colliery, 3L 10s. would buy the 6L shares of the Walsall Wood Colliery, 3L 10s. would buy the 10L shares of the Chillington Iron Company, and 5L would buy the 15L shares of the Pelsall Coal and Iron Company. Yet for none of these properties are there any buyers in the market. A dividend of 4L per share has been declared by the Cannock and Rugeley Colliery Company for the past half-year.

Highly satisfactory was the eleventh annual meeting of the South Staffordshire and East Worcestershire Institute of Mining Engineers, held at Dudley, on Monday, when Mr. Wm. North, Mayor of Dudley, was appointed President for the ensuing year, with Mr. H. Johnson as his vice. Mr. David Peacock was in the first instance elected President, but in consequence of his inability to serve a second ballot had to be taken.

In North Staffordshire the only new feature to note is the resumption of work at many of the collieries around Longton now that the men have submitted to the drop. Some hundreds of hands will, however, have to still remain out a week or so before the pits are again ready for them.

**MINE MANAGERS' CERTIFICATES.**—Of the nineteen candidates for managers' certificates under the Coal Mines Regulation Act, who put in an appearance at the recent Government examination in Wolverhampton, seven have been successful, and have been awarded Certificates of Competency by the Secretary of State in accordance with the recommendation of the examiners. They are—Messrs. C. E. Cole, Dudley; W. F. Clarke, Newent Colliery, Gloucestershire; G. Reynolds, jun., Willenhall; T. Morgan, Willenhall; F. J. Jones, Bloxwich; Richard Clay, Oswestry; and John Williamson, Hednesford.

#### REPORT FROM MONMOUTHSHIRE AND SOUTH WALES.

Feb. 21.—Again there cannot be said to be any improvement in the Iron Trade this week, and buyers seem averse, at the present juncture, to giving out anything but immediate requirements. Very few orders of importance have been heard of as having been given out as yet this year, and it is feared that this spring will not show brighter prospects. Clearances during the week have been mainly to Brazil, Spain, and Sweden. The demand for iron rails is very small, and bars are in but limited demand. Efforts are still being made, however, towards increasing the steel producing capacity of the district. New works are now commenced at Blaenavon. The Tin-plate Trade is fairly active, and in the Swansea district the works are going full time. Prices, however, have not yet changed for the better. Amidst all the depression which prevails it is satisfactory to find that the Patent Nut and Bolt Company have declared a dividend of 10 per cent. The company own an extensive works at Cwmbran, Monmouthshire. After providing for the handsome distribution for last year 5000L remains to be added to the reserve fund, and over 1600L to be carried forward. To turn to the Llynvi, Tondy, and Ogmore Coal and Iron Company, a contrast, by-the-bye, to the last item, it has been resolved to wind-up voluntarily under the supervision of the Chancery Division. The Vice-Chancellor in granting the order remarked that the company was one in which a large amount of capital had been embarked, and supposed this was one of the many failures attributable to the depression of the coal trade. Yet another company is "in trouble." A petition has been presented by two Bristol creditors to wind-up the Great Western Colliery Company (Limited). The property of the company is situated at Pontypridd. No dividend has been paid for the last four years. It is stated that it will be endeavoured to reconstruct the company.

The Coal Trade shows a little more activity, and shipments are well up to the average. Prices are unaltered but firmer; and freights are also more firm, with a slight upward tendency for the Mediterranean. Several fair contracts, there is every reason to believe, have been lately entered into, and more are to follow. The demand for steam coal is up to the usual standard, but for house coals there is not such a good enquiry, and the milder weather has caused a falling off in the consumption. Patent fuel is still dull. The collieries are as a rule irregularly employed. It will be recollected that the colliers working under the Associated Masters some time ago agreed to work at a 5 per cent. reduction for three months from Jan. 1 last. The representatives of the men promised to recommend the men to concede the reduction so long as prices remain at the low ebb they are now. They have now issued an address urging this, and pointing out that when matters change for the better the wage rate will be proportionately altered. In the course of a day or so a delegate meeting will be held.

The Nant-y-Glo and Blaina Company have now disposed of the whole of their collieries, for it is now stated that the Blaina pits are to be taken on lease by Messrs. John Lancaster and Co., proprietors of coal and iron works at Wigan. It is also said they intend to negotiate for a lease of the blast-furnaces, and if this be carried out the Valley may yet resume its wonted activity. At any rate the news must be very acceptable to the people of the locality, as it means the introduction of fresh capital; and things are gloomy enough at Nant-y-Glo and Blaina, as everyone knows.

Efforts are still being made to find occasion for those out of work in other parts of the district. A first batch of necessitous colliers were yesterday sent to Flintshire, where employment has been found for them. More are to be sent from the district.

Some Bristol creditors have presented a petition for the winding-

up of the Great Western Colliery Company (Limited), and the petition is fixed to be heard on March 1. The company was established in 1865 to purchase and work a colliery at Pontypridd, Glamorganshire. The capital raised in shares (preferences and debentures) reaches nearly a quarter of a million. During the coal famine the concern paid dividends of 40 and 60 per cent., but nothing has been paid since 1874, when 16 per cent. was divided. An effort is to be made to reconstruct the company. Messrs. George Edwin Swinbank, of Lawrence Pountney-lane, London, accountant, and William Briggs, of St. Stephen's-street, Bristol, accountant, are to be appointed liquidators for the purpose of such winding-up.

#### TRADE OF THE TYNE AND WEAR.

Feb. 21.—The close of the strike at the Steam Coal Works in Northumberland has caused an increase of business on the Tyne, and considerable shipments have been made of this valuable coal. A large Dutch East Indianer arrived from Holland on Saturday to load steam coals for Batavia, and the full rigged vessel Goshawk also arrived from Antwerp to load the same coal. Many orders have arrived since the conclusion of the strike from the North of France which have been held back. Many steamers are also in those rivers to load steam coal for the Mediterranean and other parts of the world. During the present week there have been large arrivals of foreign vessels from foreign ports. Amongst those to hand are several Russian ships which had been laid up at Hull, but which have been manned by Russian sailors sent across since the conclusion of the armistice. As remarked above the strike at the Steam Coal Works may be considered closed. At all the collieries where other differences had arisen after the acceptance of the reduction arrangements have been come to by which a general commencement was made on the 18th. The Bellington men have arranged matters with their manager, and all the men will again be employed. At Pegswood the masters demand a local reduction of 4d. per ton in addition to the 12½ per cent., and the men have not as yet agreed to this, but it is expected that a settlement will be arrived at shortly. The Eltringham Colliery, near Prudhoe, has been partially closed, owing to the depression of trade, only sufficient miners being retained to work coals necessary to carry on the manufacture of bricks, sewer pipes, and other fire-clay products, this manufacture being carried on extensively here. It is fully expected that if peace is secured, which appears to be almost certain at present, the opening of the Baltic and Black Sea will cause very considerable increase in business here, and as many collieries have been stopped during the past two years, and the output much reduced, any great increase in the demand will have a perceptible effect on the state and prospects of the coal, coke, and iron trades.

The Iron and Foundry trades continue very quiet, but iron shipbuilding is pretty brisk, and as a consequence marine engine-builders are also busy. At the great ironworks of Messrs. Hawks and Co. and Abbot and Co., Gateshead, there was much depression during the latter part of last year, but a considerable amount of bridge and other work in various branches has been received lately, and these works are comparatively active at present. At Sir Wm. Armstrong and Co.'s, at Elswick, there is considerable activity in the ordnance works and other branches, and it is understood that the firm will shortly acquire a colliery and brickworks, the produce of which will be consumed at the ironworks. The iron ore used at the blast furnaces here is nearly all imported from Spain. At Jarrow there is considerable activity in most branches, especially in iron shipbuilding and marine engine and boiler building. On Saturday a screw steamer on a new principle was launched, the first of a line of steamers intended to convey coals from the Tyne to the London gasworks. The vessel is 220 ft. long, 32 ft. broad, and 14 ft. 8 in. deep. She will be fitted with Price's patent self-trimming hatchways, and will have a patent windlass. She is flat-bottomed, and her masts, funnels, and davits and boats will be constructed to lower in order to allow the vessel to pass beneath the Thames bridges at any state of the tide. The steamer has been built (under the superintendence of Mr. A. G. Nichols) to the order of Messrs. S. and C. Nichols, London, and she is intended to run between the Tyne and the Thames with gas coal for the London Gaslight Company. She will carry 1000 tons upon a draft of 12 ft. 3 in. Her engines, which will be constructed by the builders of the vessel, will be of 100-horse power nominal. Throughout the vessel will be fitted with all the latest improvement, and she will be classed 90 A at Lloyds. As the steamer left the ways she was named the Roystons by Miss M. Armstrong. The launch was highly successful. A sister vessel to the Roystons is now upon the stocks at Messrs. Palmer's yard, and will shortly be launched.

#### REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Feb. 20.—Considerable dissatisfaction is felt among the inhabitants of the south-west of Montgomeryshire at the way in which the conservators of the River Dovey do their work. The fishing is said to be a rather close monopoly, and to be let for the most part to strangers, who, not having any interest in the industrial resources of the district, wage constant war with mineowners and other large employers of labour. This they have done with such success as to close one lead mine and prevent others being worked, the gain on the other side being a few fish. A petition numerously signed has been presented to Sir W. W. Wynn, Bart., M.P., who is the owner of extensive manorial rights in that part of the county, setting forth the grievances under which the industrial population labours for the amusement of the pleasure seekers. It is all very well to keep our rivers as pure as we can, and to get as much enjoyment out of them as possible, but there has been too much tendency of late to cripple necessary industrial enterprises for this purpose. This is a serious mistake, for, nationally, we cannot yet afford to give up business for pleasure.

James Evans was killed at Snaibach Lead Mine last Wednesday, by the explosion of a charge of powder he was in the act of ramming. Another Shropshire Mine—South Roman Gravel—concerning which many hopeful assurances have been given, seems on the point of collapsing, and serves as a further illustration of the fact that few of the "compass" mines that take their title from a neighbouring successful mine ever come into a profitable condition.

In the Llanrwst district the Clementina is seeking additional capital, which is hardly what we should have expected a year or so since. Indeed, the present condition of most of the lead mines of that district is in unfavourable contrast with the glowing pictures of early success seen and heard in the "rosate hues of their early dawn." The same is true of some of the Flintshire and Denbighshire Mines, whose names need not be specified. In reading mine reports from the whole of my district generally, I am often reminded how completely mine promoters neglect the advice given by Mrs. Glass—"First catch your hare, and then cook it." Costly machinery, outside appliances, inclines, railroads, and the like, but little or no ore. When will men apply the ordinary business faculties to mining that they do to other lines of life?

Slate quarrying operations have been recently resumed in the promontory of Llyn, Carnarvonshire, where they have been abandoned for twenty years. The old Pontrhydgoch Quarry, situate near Pwllheli, has been re-opened, and is said to promise well. Robert Roberts, an old man, 73 years of age, was killed by a fall of rubbish in the Dinorwic Slate Quarry last week. The slate trials in the Llangynog district are progressing satisfactorily. These are in a continuation of the bed worked at the old (Rhiwarth) quarry, as well as in some overlying beds, and slates of excellent quality are obtained as the trial penetrates the beds. Whenever this locality obtains railway communication it will, probably, as a slate-producing district be second to none in North Wales.

Considerable dissatisfaction is felt among the men at Padeswood Colliery, near Mold, at new rules recently introduced by charter-masters who have been brought from Staffordshire, and which, it is said, seriously curtail the little the men are now able to earn. The dissatisfaction began with the workers in the main coal, but it is spreading to those employed in other seams. Bad as the trade is, there are rumours of several old collieries being restarted in this neighbourhood. The Vron Colliery Company, near Wrexham, have



sold on advantageous terms their interest in the new colliery Plas Power, near Wrexham, to Mr. Robertson, M.P. for Shrewsbury, who was before one of the largest shareholders in Plas Power. Few of the collieries about Ruabon can be said to be working vigorously, and the men lose much time at those south of the Dee. The fire is not quite extinguished at Black Park, but the men are able to work. The "little company," formed to work the upper coal seams at Ifon Rhyon, is said to have got its capital subscribed, and is to commence operations on March 25, if not before.

The importance of a tramway in a mining district is illustrated by the fact that the Wrexham and Rhos tramway conveyed 28,433 passengers during the last six months. Power is to be asked for to use steam. There is also some prospect of the railway intended to pass through the almost unknown country lying between Denbigh and Cerrigy-Druidion being constructed. This line would open up some slate districts. The Dee Bridge Commission and the Chester Corporation oppose the withdrawal of the Birkenhead and North Wales Railway Bill, as, if I mistake not, they also did the granting of the same.

Permission has been given to have the points of law raised in the traction engine case, referred to in former reports, tried in London and not at the Denbighshire Assizes, at which in ordinary course they would have been tried. Important issues as regard mineral and, indeed, general traffic depend on this case.

#### REPORT FROM THE NORTH OF ENGLAND.

Feb. 21.—The position of the Pig-Iron Trade of the Cleveland district has not varied in any perceptible way since last week. Makers still adhere to the prices quoted then, and as we are now on the eve of the shipping season prices are likely to continue to be maintained, especially as stocks in merchants' hands are low, and the latter are, therefore, compelled to depend upon makers for the great bulk of the iron they require. In other respects the outlook of the trade is not much different to what it has been for the last fortnight. While the situation in the East continues so threatening and so complicated makers are not likely to find matters mend upon their hands; but, on the other side, the reduced output of pig-iron will tend to equalise the demand and supply, and so give greater elasticity to business. There is a decline in the shipments of Cleveland pig-iron to Scotland up to the present time, as compared with the corresponding period of last year. Foreign shipments are at present on a limited scale, but they are likely to improve as the season advances.

At a meeting this week of the creditors of Thomas Vaughan and Company of the South Bank and Clay Lane Ironworks, it was ascertained that the assets are likely to be much smaller than was originally anticipated, and that there is not much prospect of a dividend exceeding 2s. 6d. in 17. Mr. Thomas Vaughan, it will be remembered, was the son of Mr. John Vaughan, the enterprising Welshman, who came to the North of England some 30 or 35 years since, and made for himself a name and great fortune, being, with Mr. Bolekow, the founder of the great concern of Bolekow, Vaughan, and Co. (Limited) with 2,500,000l. of capital. Mr. Vaughan left his son seven years since, when he died, 750,000l. in cash, and the greatest number of blast-furnaces belonging to one concern in the North. A year and a half ago Thomas Vaughan failed for 1,250,000l. He was at that time the largest pig-iron maker in the world. The concern has since been carried on by trustees for the benefit of the creditors, being in liquidation.

The status quo of the finished iron trade continues to be maintained. Shipments of finished iron from the North-East ports are practically nil, and the only kind of iron now being made in any considerable quantity is plates. Plate manufacturers have been somewhat stiffening their prices, but not to any material extent. Angle-iron is not so much in request. Most of the merchant mills are on short time. Locomotive builders are doing a better trade, and the various works in Newcastle, Gateshead, Darlington, and Sunderland are more fully employed.

The coal trade is very depressed. Durham coals are in rather better request for shipping purposes, but prices have not improved, and the margin of profit remains very bare.

#### REPORT FROM DERBYSHIRE AND YORKSHIRE.

Feb. 21.—There is nothing new to report as to the state of affairs at the ironworks and collieries in Derbyshire, and but little stir is taking place in the lead mining districts. New collieries are being opened out, although just now there are far too many for the business doing, or that is likely to be done for a long time to come. As a rule, the men are working about four days a week at the pits, whilst at some of the large ironworks they are scarcely doing so much. The foundries are doing tolerably well, and the Bessemer works are still active. House coal is in tolerably fair request, and a good deal continues to be forwarded to the London market, which is a favourite one, and that being the case the trade gets more divided every year. Colliery owners also complain of the low prices which prevail, as well as of the competition that has to be encountered; whilst the fact that the strike in the North of England has terminated will not improve matters in any way. The rebarber coal, it may be said, has a marked advantage over the inland, for whilst the rate for the latter will be something like 7s. 9d. per ton, including city dues, that from the Tyne is carried to the Thames as low as 4s. 3d. per ton by screw steamers, exclusive of city rates. Steam coal is still quiet, but it is expected will shortly move off more freely.

In Sheffield some branches show a little improvement, more particularly with respect to steel and steel goods. The Bessemer rail establishments are as brisk as ever, and some of the houses engaged in the production of cast-steel are better off than they were some time since. Armour-plates have become quieter, and makers are now directing their attention to the making of a plate of steel and iron that will be far superior to those rolled of iron only, seeing that the latter, however thick, have not been able to resist projectiles discharged by heavy guns. No doubt many attempts will be made, resulting in failure, but there is every reason for believing that plates of great resisting power will be produced that will satisfy the requirements of our own Government. Axes and tyres are in better request, and so also are edge tools and implements. There is a steady output of superior cutlery from the leading establishments, but in other qualities trade is rather quiet. Files are still dull, and the hardeners have declined to agree to the reduction to which the other branches have submitted. Some of the foundries are favourably off for light castings, such as stoves and grates, but there is not much doing in heavy work. At the Atlas Works the puddlers and some others have received notice of a reduction of wages, which, no doubt, in the present state of trade will be agreed to. There has been no change with respect to the business doing in house coal, which is of a reasonable character, but not such as to keep the men fully employed. Prices, too, are such as leave little or no profit, and of this we had a forcible illustration early in the week, on the occasion of the annual meeting of the Holmes Colliery Company (Limited). There had been a large output of coal, but the result of the year's trading was a loss. No doubt there are many other public companies as well as private firms that could show a similar state of things.

On Monday Mr. Parkes, the Chairman of the Great Eastern Railway Company, visited Leeds, and had an interview with the Chamber of Commerce, as well as with some other bodies, with respect to the projected line from the Great Eastern to Askerne, near Doncaster, so as to enter into and tap the South Yorkshire coal field. If successful, the company propose to take coal to London over the greater part of the line at a farthing per ton per mile; the same as was proposed 14 years ago, when the scheme was successfully opposed by the Great Northern. The different bodies promised to support the undertaking. On Wednesday the same gentleman arrived in Barnsley, and met a number of leading colliery-owners that had been called together. The chair was taken by Mr. A. Chambers, of Rockingham and Thornecliffe Collieries. After hearing Mr. Parkes and the other gentlemen, the owners present promised to support the new line. It will, however, be warmly opposed in the Committee

Room of the House of Commons, it is said, by the Great Northern in particular, and it will be the great railway battle of the Session. Should the Bill be successful the colliery-owners of South Yorkshire will have a new route to the Metropolis at a much lower rate than at present.

Owing to the slackness of trade, the men employed at the Parkgate Pit of the Stafford Colliery, near Barnsley, have received notice that it will be closed next week, so that their services will not be further required.

A remarkable instance of successful management in the Sheffield steel and iron trade is disclosed in the annual report of Brown, Bailey, and Dixon (Limited), which will be issued to the shareholders to-day. Four years ago there was a debt of over 80,000l. upon the works, and although during all the time trade has been in an exceedingly depressed state, and competition more severe than at any previous period, this entire debt has been swept off, and a considerable balance carried forward to the year's account. The shares had been quoted as low as 22 dis. It was at one time feared that the firm could not weather its adversities, and in order to meet the emergency the capital of the company had to be reduced. The shares are now quoted within 10s. of those of similar manufacturing firms in the town who are paying 5 per cent. interest on their paid-up capital. While they have been able to sweep off this debt, they have at the same time kept the machinery and plant in a most efficient state, and adopted every improvement. They are at present engaged on extensive orders for rails for the Russian and other Governments, and they are able to produce quite as heavy an output as Krupp. Their profit for the year is 30,000l.

#### REPORT FROM THE FOREST OF DEAN.

Feb. 21.—With regard to the local industries most of them remain in a dull and unsatisfactory condition, but the repairs at the Park End furnaces now and for some time past going on will put the proprietor of the works in a position of readiness to start them should a change for the better in the iron trade take place in the course of two or three months' time, supposing that a more buoyant aspect should characterise the markets at the close of the anticipated Congress. It is also understood that Sewdley Works are in a state of readiness for renewed operations when the state of the iron trade will justify the venture. It is not expected that the notice of reduction at Lydney Tin-Plate Works, which will, it is said, terminate on Saturday, will lead to any stoppage, or other serious difficulty on the question of wages. A notice of reduction was also given at Lydbrook of 9 per cent., and it is hoped that matters there will be amicably settled. We believe that nothing is definitely settled as yet respecting the proposed American contract for the supply of iron from the Forest Vale Ironworks, but it is feared that the capacity of the works would not be adequate to supply the weekly quantity required.

To show the trying character of the times, we may mention that two firms of colliery proprietors, one in West and the other in East Dean, are in liquidation with their creditors, but as we have not reliable data as to particulars of the cases we only make passing reference to them. The Gale dinner came off on Tuesday last at the Speech House, but the attendance was not large, and a feeling of depression characterised the proceedings. Sir James Campbell thought if Russian promises were of a more reliable character, and workmen would learn wisdom from past experience, things might improve. Several chimed in on that point, including the Crown Receiver (Mr. Francis), and Mr. J. T. Thomas. The Chairman (Mr. Francis) made kindly reference to the late Mr. Sully, and proposed the health of his brother, Mr. S. T. Sully, of Bridgewater. Mr. Sully being a stranger in the Forest. The company included Sir J. Campbell, the Crown Receiver (Mr. Francis), J. T. Thomas, F. Morgan, T. B. Brain, G. Hough, A. Thomas, H. Phillips, E. Vinpany, H. Brown, E. M. Letcher, and others.

Having referred to the Gale dinner provided by the hospitality of the Crown Receiver, we may also refer to recent action taken by the Crown officials in reference to unopened or undeveloped gales. A rule of the Award Book is that if a gale is not opened within five years of its being granted, unless substantial reasons can be assigned in the way of difficulties preventing such opening, it becomes forfeited, and lapses to the Crown. There are both coal and iron gales in that predicament, and some notices of forfeiture have been given in the local papers, which, we understand, have led to applications for extension of time, but some, it is said, without success. It would, perhaps, be wrong to refuse applications of the kind, except where evidence of careless neglect was proved, but unless trade revives we fear that few fresh gales will be opened for some time to come. The question of dead rents is also a serious affair to galees, especially when they are fixed at unreasonable amounts. High Meadow Mine is said to be 600l. a year, and a royalty of 1s. 6d. per ton upon the ore raised, a monstrous appraisal in the judgment of many. As there are heavy expenses in sinking and developing mines, whether of coal or iron, the Crown officials should take such matters into account in fixing the amounts of dead rents and royalties. But of late years the tendency has been in the wrong direction—upwards; thus rendering Forest mining more difficult. These are moot points for the discussion of capitalists and adventurers; but, still, we must add that in increasing the difficulties of developing gales the Crown advisers and servants are not acting wisely.

Notwithstanding that it has appeared in print to-day that all our staple industries are without improvement, we are pleased to be able to report that there is some improvement in the local coal trade, but how long it will continue improved we are afraid to guess even. We hope, but at the same time fear, and therefore say no more at present.

#### THE WORKING OF TUBE WELLS.

It is not long since that two very interesting papers on patent "Abyssinian" tube wells were read before the Society of Engineers, and specially referring to those manufactured by Messrs. LE GRAND and SUTCLIFF (Magdala Works, Bunhill-row, London), who have erected a large number both for small and large wells. In the lectures the driving of tube wells was treated in an exhaustive manner. The pioneer, or first, tube being brought into position ready for beginning operations is held vertically right over the spot where the tube well is to be sunk by a tripod, in which it is retained by a latch. A wrought-iron clamp is screwed fast on to the tube, and it is the falling weight of the monkey (lifted by ropes and block pulleys attached to the tripod) on to this clamp which drives the tube into the soil. In this manner driving is continued until the top of the tube comes below the hole in the tripod head, when the smaller end of a lengthening bar is dropped into the top of the pioneer tube. This lengthening bar is merely for steadying and ensuring a vertical course of the tube in its descent; to prevent the rebounding of the lengthening rod when working in hard ground, an india rubber washer is fitted to its shoulder. In fact, the use of the plain lengthening rod is rendered necessary, as, if a fresh length of tube were added in place of it, the socket joint would not allow the monkey or clamp to slide or pass over it. In driving the tubes the clamp is shifted occasionally, and bolted firmly to the tube. When, however, the well tube has been driven into the ground to within a foot of its entire length a fresh set of tubing is screwed on to the first by suspending the monkey in the manner already explained, after which the clamp is fastened afresh at about 6 in. from the end of the tube furnished with the socket. The tube with the clamp on it is then slipped through the suspended monkey, and screwed in its place in the tripod head. Care must be taken to screw each tube length firmly into the preceding tube, so that the joint may not unscrew in driving, and so become leaky. Frequent soundings should also be taken whilst driving, in order to test whether a spring has been tapped and water reached, as well as for ascertaining what depth of earth stands in the tube; the latter is removed by means of small cleaning-out tubes, usually  $\frac{1}{2}$  in. internal diameter, in lengths to suit any depth, which are screwed into each other to form one continuous rod.

In soils of a wet loose sandy nature before using a pump it becomes advisable to use a funnel of particular form, which is screwed on to the top of the well tube, so as to facilitate the pouring down of water; the subsequent pumping out of this water removes some portions of the sand and mud, which operations are continued until all the earthy matter has been removed. When a water supply is reached and stands several feet in the tube a pump is screwed on to the tube. This pump is started by pouring water down the tubes to exhaust the air in the upper tube portions, after which the pump may be worked. The handle of the pump after working a short time should be raised high for a second or two, and this should be repeated several times; this has the effect of causing the water to force its way violently in and out of the perforations at the tube-well bottom, and though the pumped water will become much dirtier, this stirring up will disintegrate the soil, and clear away all the finer particles in the immediate vicinity of the tube perforations, leaving an effectual filter bed for the water to pass through into the tube; this is proved by the fact that steady pumping in a short time actually brings up all the mud and fine particles, after which the water flows out clear, and it may be added that upon the careful carrying out of these precautions depends to a large extent the quantity of water that will be obtained, as well as the future continuous working of the pumps. To still further exemplify this it may be stated that the soil around the perforations of the

bottom tube should become somewhat open, as it will do when a tube well has been well driven and ready for working. The rapid accumulation of sand, &c., may in some cases prevent the pump from raising the water, and where such occurs the cleaning tubes must be employed, after which the pump may be again screwed on and pumping continued.

Another plan of fixing these well tubes ready for work dispenses with the forementioned tripod, and is the plan adopted by the Royal Engineers, and consists in attaching the pulleys to a clamp which firmly grips on to the upper portion of the top tube. It is certainly much simpler to fix than the method first named, although the tube loses much of its steadiness in being driven, but the main object gained is lightness in transport.

When from some purpose or other it becomes necessary to withdraw a tube from the ground, this can be accomplished by first slipping the monkey over the tube and passing it on again in an inverted position. After attaching it to the rope-pulleys again the clamp should be bolted above instead of being under the monkey. The operation will thus be reversed—that is to say, the pull of the ropes and subsequent shocks of the monkey against the clamp gradually draw the imbedded tubes out of the ground. This plan of withdrawing tubes is not applicable to the Royal Engineers' method, hence it becomes necessary to devise some other means of withdrawing sunken tubes; the latter may be accomplished by fastening the clamp to the tube a few inches above the ground, and by using the detached monkey as a fulcrum the tube may be gradually pried up by employing the lengthening bar, which operation is continued till the necessary tube length has been extracted from the ground. When the water level is but a few feet below the reach of a section pump another method may be adopted—it consists in digging first to a depth of 5 or 6 ft., after which the top length of tubing is unscrewed for the purpose of first ensuring a clear water supply by pumps process previously explained. As soon as clear water is obtained a long barrelled pump is screwed on, and the hole excavated is then filled up again.

In the forementioned lecture a full description was given of the apparatus used in cases where the water level stands a considerable depth below 28 feet from the surface, and a short description of the means employed for facilitating the obtaining of large water supplies may now be given. For large supplies it is found preferable to couple several small tube wells together rather than increasing the diameter of the tubes by the limit of 3 in. in diameter. The manner in which this is done is very simple; a number of wells about 20 ft. apart, according to strata, are sunk, and coupled by short pipe-bends to the main, which is generally placed about 2 ft. below the ground surface, so as to be out of the way; thus a far larger area of ground is drawn from than is actually obtained by any existing well. In sinking a set of wells the ground is always tested by small  $\frac{1}{2}$ -in. tubes, which saves the large tubes from unnecessary wear and tear; each 3-inch well is pumped until clear water flows from it before connecting it to the mains. It is advisable to put a stop valve in the mains between the pumping-engine and the wells, as if the pump should happen to lose its water it is apt to cloud the wells. In some localities, where the fine sand would soon completely choke the small perforations of the tube well, a special perforated tube is employed, which is termed a sand tube; in addition to this sand tube, it is at times advantageous to utilise a vacuum chamber, and this is done by introducing an inner suction-pipe with a top flange, which is shut in between the top of the tube well and the pump, so that when the water in the well is lowered a partial vacuum is created in the annular space outside the suction-pipe. There are, however, some situations where the water-bearing soils are so fine and floury that to shut them back would have the tendency of keeping back the water. For such localities the practice has been followed of replacing the usual large quantities of sand pumped up by inserting artificial gravel beds in their place. The manner in which this is done can be best explained by stating that after temporarily removing the pioneer tube and pumping up a quantity of sand as much gravel is forced ramrod fashion down the well tube as would form a filter bed for the water. When this has been accomplished the open well-tube is withdrawn, and the permanent closed and pointed tube is then driven into the gravel filter bed. Arrangements are also made by means of which the supply may be augmented and developed by utilising every water-bearing soil through which the tube-wells pass.

#### ATMOSPHERIC GAS ENGINES.

For some time past gas engines have been coming more into favour, and many important improvements have been from time to time introduced; Mr. L. SIMON, of Nottingham, has now made some further progress. According to his invention atmospheric air is compressed by a pump, and stored in a reservoir, from which it is withdrawn and utilised in fixed quantities by suitable valves under control of the moving mechanism after the engine is first started. In connection with the inlet valve chamber, which is of a given dimension, is another valve, by which coal gas, under ordinary pressure of towns or by other pressure, is caused to enter the chamber of the air-pump that the two agents may become thoroughly mixed, and in certain proportions for obtaining the best results from explosion and consequent expansion within a cylinder in which a piston is fitted as in ordinary gas engines. A separate compression pump for gas may also be applied, so that the gas and air may be compressed separately and allowed to mix under pressure at any convenient point before entering the explosion cylinder.

The coal gas, or it may be other gas, such as that known as benzoline gas, can be injected into the air vessel or reservoir of the air pump at the same time as the air, or alternately with it, so that the two—i.e., the air and the gas—not only become thoroughly mixed but put under pressure. The air gas thus compressed is conveyed to the working cylinder of an engine by pipes, a distinct pipe taking either ordinary coal gas or benzoline gas into the cylinder after each charge has exploded, by the remains or refuse of which atmospheric air being admitted by a separate pipe to sustain this flame, a light is produced for exploding the fresh main charge which is directly after the exhaust admitted to the cylinder. By this means the explosion of one charge takes place by a light left burning after the previous charge, and so on alternately. In lieu of the coal or benzoline gas being of the ordinary kind, it may be had by a distinct pipe from the contents of the reservoir, in which case a constant light for firing the charge can be maintained. He purposes using a carefully balanced fly or power wheel with this class of engine to ensure the return of this piston by its momentum, and thereby an exhaust, the explosions always happening while the crank is effecting the forward or upward thrust, and the exhaust of each expended charge on the return. The piston-rods of two such engines being coupled to one crank, and working alternately with force, will effect a great saving.

One of the great objections to gas engines hitherto made, and a cause of their great relative cost, has been the great dimensions necessary to obtain adequate power. By admitting the air and gas under a pressure varying (say) from 20 lbs. to 80 lbs., he obtains sufficient power from explosions in a small cylinder, and the other parts of the engine are small in proportion. The engine can also be made double-acting by the use of two cylinders, the explosions in which take place alternately.

MINING IN CARDIGANSHIRE.—We have received a copy of the map of the mines of Cardiganshire by Capt. A. Francis, mining engineer and surveyor, Goginan, Aberystwith. It shows the position of the various mines, and the estimated returns of ores from the earliest periods to 1878, together with the depth of each mine. It is neatly got up, and the mines are coloured pink, and at the low price of 2s. is well worthy the attention of investors in the mines of the county.

WHEAL PEEVOR.—The south lode has been intersected in the deep adit level, which is about 50 fms. from surface; this lode is now seen for about 80 fms. in height, and has opened up an immense quantity of valuable ground, so that the present returns of about 36 tons of tin per month could easily be increased.



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Incorporated under the Companies Acts, 1862 and 1867, whereby the liability of shareholders is limited to the amount of their shares. Capital £50,000, in 5000 shares of £10 each. Payable as follows:—£1 per share on application; £1 per share on allotment. Calls not to exceed £1 per share, at intervals of not less than three months. If no allotment is made the deposit will be returned in full.

**ABRIDGED PROSPECTUS.** THIS COMPANY IS FORMED FOR THE PURPOSE OF ESTABLISHING WORKS FOR THE REPAIRING OF RAILWAY WAGONS AT THE VARIOUS RAILWAY STATIONS, SIDINGS, AND JUNCTIONS IN ENGLAND AND WALES.

The company have acquired the services of Mr. Alphens Smith as managing director, who has had many years' experience in the building, repairing, buying, selling, and letting on hire of railway wagons. His remuneration is to a great extent dependent upon the profits of the company.

Although this company is not taking to an established business, for which a considerable amount is generally paid for goodwill, a large number of wagons have already been promised for the company to repair.

The directors confidently look forward to satisfactory results, and fully believe that such a company as this will not only prove a highly remunerative and profitable investment to capitalists, but a great boon to railway wagon owners generally.

The company will commence operations at the principal stations and junctions on the Midland, Great Western, Great Northern, London and North Western, and Great Eastern Railways, and extend the district from time to time as occasion requires.

No promotion money whatever will be paid for the formation of the company. No contracts or agreements have been made previous to the registration of the company.

Full prospectuses and forms of application for shares can be obtained on application to the Secretary, at the offices of the company, 79, Mark-lane, London, E.C. The Memorandum and Articles of Association of the company may be seen at the offices of the company.

## In the Court of the Vice-Warden of the Stannaries. Stannaries of Cornwall.

**IN THE MATTER OF THE COMPANIES ACTS, 1862 AND 1867, and of the NEW CONSOLS SILVER AND ARSENIO WORKS (LIMITED).**—Notice is hereby given, that a PETITION for the WINDING-UP of the above-named company by the Court was, on the 19th day of February instant, presented to the Vice-Warden of the Stannaries by John Clark Isaac and Charles Isaac, trading in co-partnership as iron merchants, at Liskeard, within the said Stannaries. Edward Rendell, of Callington aforesaid, builder, creditors of the said company, and John Rashleigh, of Callington aforesaid, builder, creditors of the said company, and that the said petition is directed to be heard before the Vice-Warden, at the Princes Hall, in Truro, within the said Stannaries, on Wednesday, the 6th day of March next, at Eleven o'clock in the forenoon.

Any contributor or creditor of the company may appear at the hearing and oppose the same, provided he has given at least two clear days' notice to the petitioners, or their solicitor, of his intention to do so, such notice to be forthwith forwarded to P. F. SMITH, Esq., Secretary of the Vice-Warden, Truro.

Every such contributor or creditor is entitled to a copy of the petition and affidavit verifying the same from the petitioners or their solicitor within 24 hours after requiring the same, on payment of the regulated charge per folio.

Affidavits intended to be used at the hearing, in opposition to the petition, must be filed at the Registrar's Office, Truro, on or before the 4th day of March next, and notice thereof must at the same time be given to the petitioners or their solicitor.

Dated Truro, 21st February, 1878. (Solicitor for the said Petitioners).

**RE DIMSDALE—NORTH WALES.** TO COLLIERY OWNERS, POTTERY MANUFACTURERS, AND OTHERS. THE VALUABLE PLANT, MACHINERY, AND EFFECTS, AND ABOUT TWO THOUSAND TONS OF FIRE-CLAY.

**MESSRS. VENTOM, BULL, AND COOPER** are instructed to **SELL, BY AUCTION**, on the premises, the **FIFTH COLLIERY, BRYMBO, near WREXHAM**, on Tuesday, March 5, 1878, at Twelve for One o'clock, the

**PLANT, MACHINERY, AND EFFECTS**, comprising about 35 tons RAILS, 2 signal posts and gear, head-gear to pits, winding drums, 130 fms. wire rope, 19 horse power WHIM ENGINE, 14 horse power horizontal WINDING ENGINE, TWO wrought-iron egg-end BOILERS, pair of 9 in. cast-iron deep well pumps and gears, 6 horse power DUNKLEY ENGINE, powerful treble-purchase winch, wrought-iron screw, 18-ton Pooley's Patent weighing machine, 1 ton ditto, ranges of sheds, smith's tools, timber staging and framing, office fittings, and miscellaneous effects; also, about 2000 tons of excellent fire-clay.

N.B.—The WHOLE of the **PLANT, MACHINERY, FIRE-CLAY, and EFFECTS** on the premises will be offered, in the first instance, in One Lot—thus affording an opportunity of obtaining a most compact colliery in full working order, at the break-up value of the plant, &c., alone. May be viewed.

Catalogues may be had of Messrs. **LINKLATER, HACKWOOD, ADDISON, and BROWN**, Solicitors, 7, Walbrook, London; of **W. L. CLIFTON BROWN, Esq.**, the Trustee, 35, Old Jewry, London; at the Wynnstay Arms Hotel, Wrexham; the Grosvenor Hotel, Chester; on the Premises; and of the Auctioneers, 35, Old Jewry, London.

TO PROMOTERS. **WORLE HILL, SOMERSET.** **SALE OF MINERAL RIGHTS.** MARCH 25th, 1878.

At the Railway Hotel, Weston-super-Mare, at Five for Six in the evening. **MR. NORTON WILL SELL, BY AUCTION, the MINERALS (LEAD AND CALAMINE)** below 20 feet from the surface, under about SEVENTY FIVE ACRES of Land at **WORLE HILL**.

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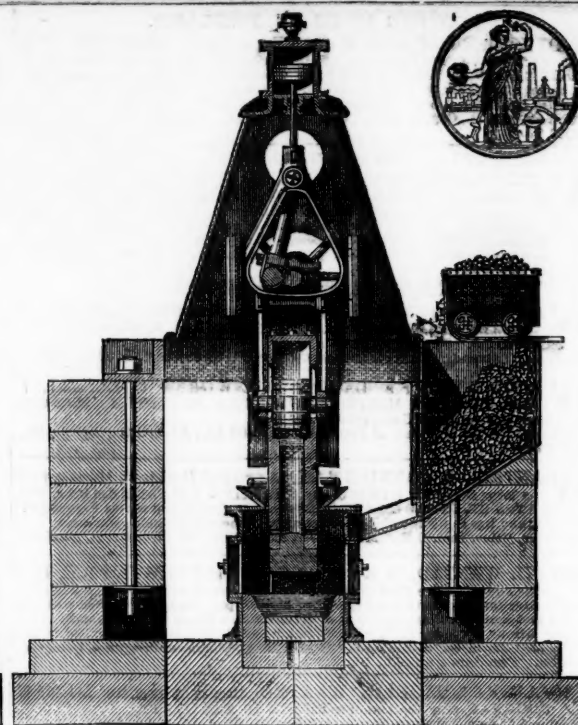
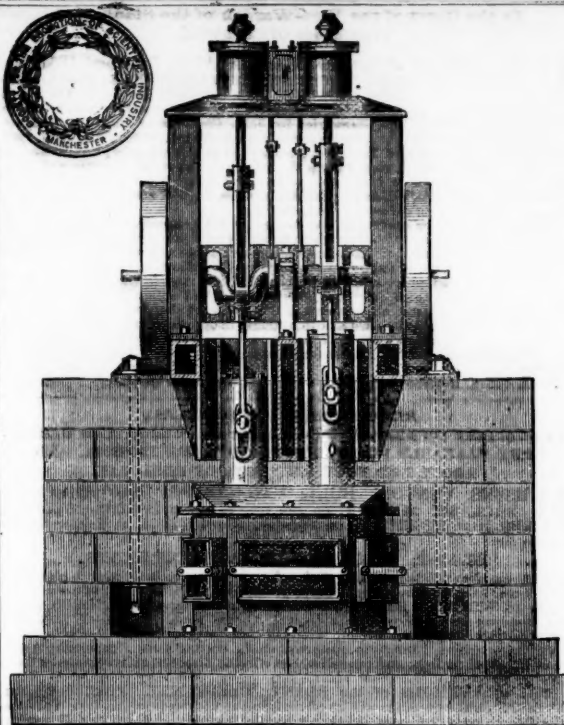
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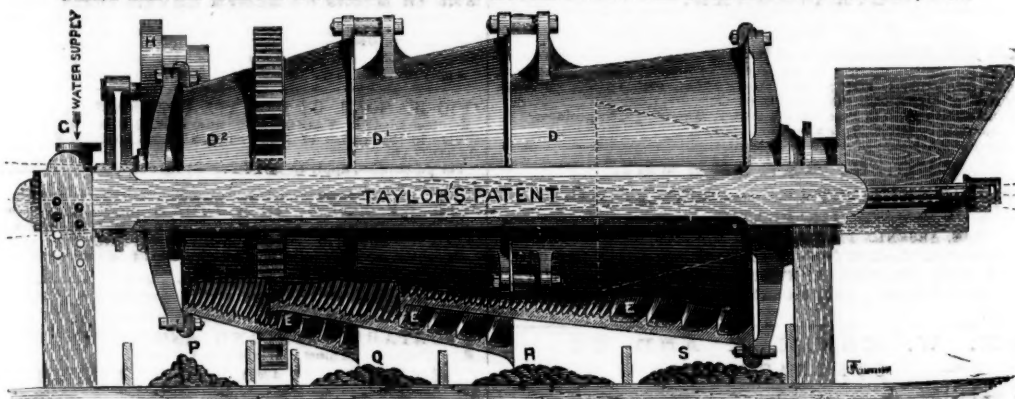
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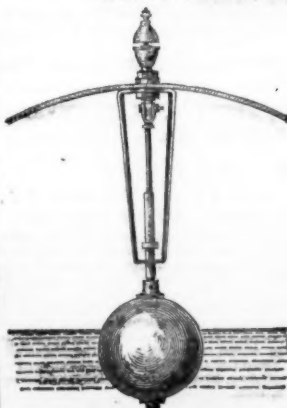
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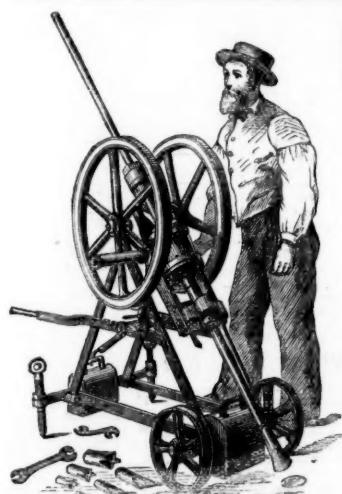
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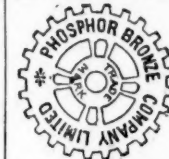
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This alloy has very great tensile strength ...	
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## THE MINING SHARE LIST.

## NON-DIVIDEND MINES.

## IRON AND COAL COMPANIES.

## BRITISH DIVIDEND MINES.

Shares.	Mines.	Paid.	Last wk. Clos. pr.	Total divs. Per sh. Last pd.
1500 Alderley Edge, c, Cheabre*	10 0 0	1 10 0	1 10 0	12 11 8. 0 5 0. Jan. 1876
4000 Brookwood, c, Buckfastleigh	1 10 0	1 10 0	1 10 0	3 16 0. 0 2 0. Nov. 1875
2000 Bryn Alyn, c, Denbigh	10 0 0	1 10 0	1 10 0	0 7 0. 0 7 0. Jan. 1877
8400 Cawthell, c, Cumberland*	2 10 0	2 10 0	2 10 0	1 9 6. 0 2 0. Aug. 1876
1000 Carn Brea, c, t, Illogan†	26 7 6	26 7 6	26 7 6	398 0 0. 1 0 0. Feb. 1874
2450 Cook's Kitchen, c, Tavistock†	24 4 9	24 4 9	24 4 9	11 17 0. 0 7 6. Jan. 1873
10240 Devon Gt. Consols, c, Tavistock†	1 0 0	1 0 0	1 0 0	116 15 0. 0 5 0. July 1877
4296 Dolcoath, c, t, Camborne	10 14 10	10 14 10	10 14 10	112 1 3. 0 5 0. Dec. 1877
8000 East Black Craig, c, t, Scotland	5 0 0	5 0 0	5 0 0	0 10 0. 0 10 0. Feb. 1877
300 East Darren, c, t, Carnarvonshire	32 0 0	32 0 0	32 0 0	235 10 0. 1 0 0. Feb. 1877
6100 East Pool, c, t, Illogan	0 9 9	0 9 9	0 9 9	15 4 9. 0 2 6. Dec. 1877
40100 Glasgow Carr, c, t, 10,000 £1 p., 10,000 15s. p.	1 13 13	1 13 13	1 13 13	0 13 4. 0 6 6. Feb. 1877
7500 Greenock and Merilyn Cons., c, t, Flint 2 10 0	5 4 4	5 4 4	5 4 4	0 5 0. 0 5 0. Nov. 1877
18000 Great Lylife, c, t, Illogan†	4 0 0	4 0 0	4 0 0	0 2 6. 0 2 6. Apr. 1876
618 Gt. Retallack, c, t, Penzance	2 10 0	2 10 0	2 10 0	23 3 0. 0 1 0. Jan. 1878
6400 Green Hurth, c, t, Durham	5 18 6	5 18 6	5 18 6	0 16 0. 0 3 0. May 1876
20000 Grogwinion, c, t, Carnarvonshire	2 0 0	2 0 0	2 0 0	0 14 0. 0 2 0. Jan. 1877
9830 Gunglialake (Clitters), c, t, c	5 6 0	5 6 0	5 6 0	0 13 0. 0 1 0. Oct. 1876
60000 Holmbush, c, t, c, t, Callington†	1 0 0	1 0 0	1 0 0	0 4 6. 0 6 6. Sept. 1877
2400 Isle of Man, c, t, c, t, Man†	26 0 0	26 0 0	26 0 0	82 8 0. 0 10 0. Feb. 1876
20000 Leadhills, c, t, Lancashire	6 0 0	6 0 0	6 0 0	0 12 0. 0 6 0. Oct. 1877
400 Lisburne, c, t, Lancashire	18 15 0	18 15 0	18 15 0	584 10 0. 1 0 0. Nov. 1877
14000 Llanello, c, t, Montgomery	3 0 0	3 0 0	3 0 0	0 9 0. 0 4 6. Nov. 1876
9000 Marke Valley, c, t, Linkinhorne	5 3 8	5 3 8	5 3 8	7 15 0. 0 2 0. Jan. 1876
10000 Mellanor Copper, Hayle†	2 0 0	2 0 0	2 0 0	0 2 0. 0 2 0. Jan. 1876
20000 Miners Mining Co., c, t, Wrexham†	8 0 0	8 0 0	8 0 0	67 10 0. 0 2 0. Feb. 1878
20000 Mining Co. of Ireland, c, t, c, t, c	7 0 0	7 0 0	7 0 0	23 17 6. 0 2 6. Feb. 1878
444 North Bury, c, t, Chacewater	2 9 6	2 9 6	2 9 6	1 10 0. 1 0 0. July 1878
1289 North Hendre, c, t, Wales	5 4 5	5 4 5	5 4 5	1 12 6. 0 2 6. Aug. 1877
30000 Penty Mwyn, c, t, Mold (8794 sh.)	2 0 0	2 0 0	2 0 0	0 1 0. 0 1 0. Feb. 1878
10000 Penty Mwyn, c, t, Redruth	0 8 6	0 8 6	0 8 6	0 9 0. 0 9 0. June 1877
6000 Pennant, c, t, St. Agnes	3 2 6	3 2 6	3 2 6	3 13 6. 0 2 0. July 1875
6000 Pennant, c, t, North Wales*	5 0 0	5 0 0	5 0 0	0 5 0. 0 5 0. Mar. 1877
45783 Penrith, c, t, c, t, Gwynedd	2 0 0	2 0 0	2 0 0	0 2 8. 0 8 0. Nov. 1875
10000 Prince Patrick, c, t, c, t, Holywell	1 0 0	1 0 0	1 0 0	0 4 0. 0 1 3. Jan. 1876
10000 Red Rock, c, t, Cardigan	2 0 0	2 0 0	2 0 0	0 4 0. 0 8 0. May 1877
12000 Roman Gravel, c, t, Salop*	7 10 0	7 10 0	7 10 0	74 10 0. 2 0 0. Dec. 1877
612 South Cardigan, c, t, St. Cleer	1 5 0	1 5 0	1 5 0	3 5 0. 0 7 0. Jan. 1878
6128 South Cardigan, c, t, St. Cleer	6 8 6	6 8 6	6 8 6	0 5 0. 0 3 0. July 1877
12000 St. Harmon, c, t, Montgomery	3 0 0	3 0 0	3 0 0	4 17 0. 0 1 0. Oct. 1876
10000 So. Tr. Patrick, c, t, c, t, c, t, c	1 0 0	1 0 0	1 0 0	50 8 6. 0 5 0. May 1877
12000 Tankerville, c, t, Salop	6 0 0	6 0 0	6 0 0	22 15 6. 0 12 0. Jan. 1878
8000 Throft, c, t, Pool, Illogan†	9 0 0	9 0 0	9 0 0	55 10 0. 0 10 0. Feb. 1878
15000 Van, c, t, Llanello*	4 5 0	4 5 0	4 5 0	1 19 0. 0 10 0. Feb. 1878
3 900 W. Chiverton, c, t, Penzance	12 10 0	12 10 0	12 10 0	1 19 0. 0 10 0. Feb. 1878
173 West Pore, c, t, St. Day	10 0 0	10 0 0	10 0 0	3 12 6. 0 1 0. Dec. 1877
512 West Tolgar, c, t, Redruth	95 10 0	95 10 0	95 10 0	0 12 0. 0 3 0. Nov. 1877
2048 West Wheel Franchise, c, t, c, t, c	28 13 0	28 13 0	28 13 0	15 10 0. 1 10 0. Oct. 1877
12000 West Wye Valley, c, t, c, t, c	3 0 0	3 0 0	3 0 0	8 5 0. 0 6 0. July 1875
1024 Wh. Eliza Consols, c, t, St. Austell	3 0 0	3 0 0	3 0 0	11 19 6. 0 2 6. Dec. 1874
2048 Wheel Jane, c, t, Kea	2 13 0	2 13 0	2 13 0	522 10 0. 4 0 0. Aug. 1872
4295 Wheel Kiddy, c, t, St. Agnes	5 4 8	5 4 8	5 4 8	0 10 0. 0 4 0. Oct. 1877
25500 Wh. Newton, c, t, c, t, c, t, c	1 0 0	1 0 0	1 0 0	0 10 0. 0 4 0. Oct. 1877
80 Wheel Oriel, c, t, St. Just	86 5 0	86 5 0	86 5 0	0 10 0. 0 4 0. Oct. 1877
6000 Wheel Prussia, c, t, Redruth	0 5 0	0 5 0	0 5 0	0 10 0. 0 4 0. Oct. 1877
10000 Wye Valley, c, t, Montgomery*	8 0 0	8 0 0	8 0 0	0 10 0. 0 4 0. Oct. 1877

## FOREIGN DIVIDEND MINES.

35510	Alamillos, <i>l</i> , Spain†	2 0 0	...	2	1 1/2	2	1 18 3...	0	1 0...	Oct. 1877
30000	Almaden and Tinto Consl., <i>s</i> , <i>l</i> ...	1 0 0	...	2 1/2	3 1/2	...	0 6 3...	0	1 0...	May 1877
10000	Australian, <i>c</i> , South Austral. <i>s</i> ...	7 7 8	...	2	1 1/2	2	0 19 6...	0	1 0...	July 1877
15000	Birdseye Creek, <i>c</i> , California*	5 0 0	...	...	...	...	0 10 0...	0	10 0...	Nov. 1872
12220	Burra Burra, <i>s</i> , So. Australia*	4 0 0	...	3 1/2	3 1/2	...	0 14 0...	0	2 8...	June 1874
20000	Cape Copper Mining, <i>s</i> , So. Africa*	7 0 0	...	33	32 33	...	70 0 0...	0	10 0...	Oct. 1874
34433	Cedar Creek, <i>c</i> , California*	5 0 0	...	...	...	...	29 12 6...	0	17 6...	Dec. 1877
35000	Cesena Sul. Co., Romania, Italy*	10 0 0	...	3 1/2	3 1/2	...	0 8 0...	0	2 6...	June 1877
15000	Chicago, <i>s</i> , Utah*	10 0 0	...	2	1 1/2	2	0 10 0...	0	3 0...	Aug. 1877
60000	Colorado United, <i>s</i> , Colorado*	8 0 0	...	1 1/2	1 1/2	1 1/2	2 8 0...	0	4 0...	Nov. 1876
10000	Copalco, <i>c</i> , Chili† (250 shares)	18 15 0	...	...	...	...	7 11 5...	0	4 0...	Jan. 1878
100000	Don Pedro North of the Bay†	0 16 0	...	...	3 1/2	3 1/2	2 6 0...	0	3 0...	May 1877
25500	Eberhardt & Aurora, <i>s</i> , Nevada†	10 0 0	...	6 1/2	6 1/2	6 1/2	1 8 0...	0	3 0...	Dec. 1877
10000	Elgin & Australian, <i>c</i> , St. Aust.	2 10 0	...	1 1/2	1 1/2	...	2 15 0...	0	1 0...	Mar. 1877
10000	Flanagan, <i>s</i> , Utah*	10 0 0	...	...	3 1/2	1	4 2 0...	0	3 0...	Mar. 1877
25000	Fortuna, <i>s</i> , Spain†	2 0 0	...	5 1/2	5 1/2	5 1/2	6 14 10...	0	0 10...	July 1878
50000	Frontino & Bolivia, <i>c</i> , New Gran.*	2 0 0	...	2 1/2	1 1/2	2 1/2	0 1 0...	0	1 0...	Oct. 1877
80000	Gold Run, <i>hyd</i> , ...	1 0 0	...	...	...	...	0 2 4...	0	0 4...	Oct. 1876
60000	Kapunda Mining Co. Australian†	1 30	...	...	...	...	0 2 4...	0	6 6...	June 1878
20000	Last Chance, <i>s</i> , Utah	5 0 0	...	1	...	...	0 14 0...	0	2 0...	July 1878
15000	Linares, <i>l</i> , Spain†	3 0 0	...	6 1/2	6 1/2	...	17 3 10...	0	6 8...	Oct. 1877
60000	London and California, <i>c</i> , <i>sh</i> ...	2 0 0	...	3 1/2	3 1/2	...	0 1 0...	0	1 0...	July 1876
7837	Lusitania, Portugal† (25 sh.)	8 10 0	...	...	...	...	0 11 6...	0	1 6...	Mar. 1878
6000	Mamm. Copperopolis of Utah, <i>c</i> , 10	0 0 0	...	...	...	...	0 5 0...	0	5 0...	Dec. 1872
5000	Mountain Chief, <i>s</i> , Utah*	10 0 0	...	...	...	...	0 4 0...	0	4 0...	Jan. 1878
10000	Pontbiquet, <i>s</i> , France†	20 0 0	...	26	25 27	...	25 8 0...	0	11 0...	Nov. 1877
60000	Port Phillip, <i>c</i> , Clunac†	1 0 0	...	3 1/2	3 1/2	...	1 10 0...	0	1 0...	Jan. 1878
54000	Richmond Consols, <i>s</i> , Nevada†	5 0 0	...	8 1/2	7 1/2	8 1/2	4 4 0...	0	7 6...	Feb. 1878
40000	Santa Barbara, <i>s</i> , Brazil	0 10 0	...	1 1/2	1 1/2	1 1/2	0 3 9...	0	13...	May 1877
120000	Scottish Australian Mining Co.†	1 0 0	...	1 1/2	1 1/2	1 1/2	15 per cent.	...	Nov.	1878
80000	Scottish Austral. Mining Co., New	0 10 0	...	1 1/2	1 1/2	1 1/2	15 per cent.	...	Nov.	1877
112500	Sierra Buttes, <i>c</i> , California†	2 0 0	...	1 1/2	1 1/2	1 1/2	0 14 0...	0	2 0...	Nov. 1877
60000	South Aurora, <i>s</i> , Nevada†	5 0 0	...	3 1/2	3 1/2	3 1/2	0 14 0...	0	2 0...	Nov. 1878
225300	St. John del Rey† (25 stock & multiples dealt in)	320 330	...	320 330	320 330	...	15 per cent.	...	p. et. for Dec.	1878
20000	Tolima, <i>c</i> , So. America	5 0 0	...	...	...	...	0 11 6...	0	0 7...	May 1874
25000	Victoria (London), <i>c</i> , Australia	1 0 0	...	3 1/2	3 1/2	...	0 12 0...	0	0 7...	Jan. 1878
15000	Western Andes, <i>s</i> , New Granada	5 0 0	...	...	...	...	0 12 0...	0	12 0...	July 1876
91000	W. Prussian (5000 pref. sh. 10d. pd)	10 0 0	...	11 1/2	10 1/2	11 1/2	1 8 0...	0	4 0...	Jan. 1878

## NON-DIVIDEND FOREIGN MINES.

Shares.	Mines.	Paid.	Last Pr.	Clos. Pr.	Last Cal.
5000 Anguilla Phosphate, West Indies (4000 issued)	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
8000 Argentine, c, t, Argentina Republic	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
8000 Belarista, c, Peru† (210 shares)	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
40000 Blue Tent, c, t, California	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
49955 Chontales, c, t, Nicaragua†	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
16000 Condes de Chili, c, t, c	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
90000 English Australian, c, t, Victoria	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
55000 Excelsior Hydraulic Gold Washing Co., California*	6 0 0	6 0 0	6 0 0	6 0 0	6 0 0
100000 Exchequer, c, t, California†	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
40000 Holcombe Valley, c, t, California	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
8000 Hornachos, c, t, Spain	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
12000 Huatafall, c, t, Orebro, Sweden	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
12000 Hunter Consolidated, c, t, Utah	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
20000 Imperial Brazilian Collieries, Brazil†	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
90000 I. L. & Co., c, t, California*	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
60000 Javali, c, t, Nicaragua*	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
3500 La Mancha, c, t, Newfoundland	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
12000 Laneston, c, t, c, t, c, t, c	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0
40000 Malabar, c, t, Colombia† (67185 issued)	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
12000 Malpaso, c, t, Colombia† (7400 pref. shares, fully paid)	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
12000 Menziesberg, c, t, Honner, Germany*	8 5 0	8 5 0	8 5 0	8 5 0	8 5 0
4588 New Benesberg, c, t, Germany	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
60000 New Quebrada, c, t, Venezuela	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
30000 New Zealand Kapanga, c, t, Coromandel†	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
30000 Oregon, c, t, U.S. (preference shares)	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
60000 Panuclillo, c, t, Chile† (250000 debentures)	4 0 0	4 0 0	4 0 0	4 0 0	4 0 0
50000 Pastorena United, c, t, Italy†	4 0 0	4 0 0	4 0 0	4 0 0	4 0 0
60000 Providencia and New Rosario, c, t, Mexico*	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
50000 Rica, c, t, Colombia† (40000 issued)	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
2,151,000 Rio Tinto, c, t, c, t, c, t, c	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
1000000 Rossa Grande, c, t, Brazil† (21 shares)	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
30000 Russia Copper, c, t, Greenland and Ufa†	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
25000 San Pedro, c, t, Chile†	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
10000 Silver Plume, c, t, Colorado	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
80000 Teocoma, c, t, Utah	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
50000 Thornhill Reef, c, t, California†	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
43174 United Mexican, c, t, Mexico†	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
14000 Utah, c, t, Utah†	28 15 3	28 15 3	28 15 3	28 15 3	28 15 3
25000 Vimeberg, c, t, Rheinbreitbach, Germany† (22 shares)	5 0 0	5 0 0	5 0 0	5 0 0	5 0 0
18000 Yorke Peninsula, c, t, South Australia	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
40000 Yorke Peninsula, c, t, South Australia	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0

\* Have made calls since last dividend was paid.

## FOREIGN AND MISCELLANEOUS STOCKS, BONDS, LOANS, AND TRUSTS.

Clothing Prices.		Foreign and Col. Gov. Trusts, & CLOSING PRICES.	
Argentine, 1868, 6 per cent.	65 70	Foreign and Col. Gov. Trusts, 5 p. ct.	65 70
Bolivia, 6 per cent.	19 20	Do., 5 per cent., 2d issue	50 55
Brazilian, 1868, 6 per cent.	90 92	Do., 6 per cent., 1st issue	52 57
Chilian, 1868, 7 per cent.	101 103	Do., 1872, 4th issue	43 47
City of Providence, 6 p.c. coupon bonds	79 80	Do., 1873, 5th issue	52 56
Egyptian, 5 per cent. pref.	48 49	Russian, 1870, 6 per cent.	123 134
Do., unified debt, scrip.	27 27 3/4	Do., 1872, 5 per cent.	104 11
Do., 7 per cent., K.M.L.	60 64	Spanish, 4 1/2 per cent. L. Mort.	93 97
Do., 8 per cent., K.M.L.	63 67	United States, 5 p. ct.	93 97
Do., 7 per cent., K.M.L.	42 47		